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#190 August 2006

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65 ways the PC changed the world

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This issue was brought to you by...

PCFormat
Welcome

Another month, another kick in the teeth for AMD? We've been following the launch of Intel's Conroe processors for more than a couple of issues now, so it'll come as no surprise to regular readers that the Intel story just gets more and more compelling with each passing week.

It's going to take quite something for AMD to maintain its place in the hearts of gamers while its rival is employing its own tactics against it – outperforming and underpricing at every corner.

Still, at least we can be fairly sure AMD will recover. It has a good fighting fund and the desire to be number one again and perhaps this is a timely reminder that nothing last for ever in the computer industry – a fact which a cursory glance over our Greatest PC Moments feature will attest to. Out of all the big names that have shaped the first 65 years of modern computing, it's startling to see so many are no longer with us. But what we want to know is which ones are still important to you? Take a trip down memory lane over on page 37 and then mail us or join in at the forum with your treasured PC memories.

Enjoy the issue,

Adam Oxford, Editor

Alec Meer, Deputy Editor

Having spent most of the month pillaging his memory and others for the definitive list of greatest PC moments, Alec clearly needed a bit of a lie down, and took his first reasonable holiday of the year. Over deadline week. Still, revenge will be served cold – next issue Adam is planning exactly the same trick. But can the world's greatest PC magazine really be trusted to a man who killed his entire lawn in one go?
Achievement of the month Being disturbed during his holiday to write this flawless prose.

Al Bickham, Technical Editor

This month, we made with the molexes and hard-wired Al into the *PCF* test rig to benchmark NVIDIA's 7950 GX2 dual GPU card against everything else worth a damn. His electrical graft can be boiled down to the inescapable conclusions on page 58. Basically, it's the badger's nadgers. This, and Conroe, in the same issue? Ambassador, you are really spoiling us...
Achievement of the month: Broke the World Shouting Record (again), with the assistance of ATI's catalyst drivers.

James Carey, Games Editor

It's been a great month for games. James loves it when a new title appears out of nowhere and looks stunning. He likes it more when *PCF* is the first mag to get an in-depth Q&A with the devs responsible. Turn to p26 to see what's got him so excited. We've also got two other big games features, bringing you closer to the most interesting game makers in the industry.
Achievement of the month Getting on the exclusive betas for two of the biggest games of next year. W00t!

Jeremy Laird, Technology Writer

When arch-miserablists Radiohead sang "arrest this man, he talks in maths," they could have been referring to *PCFormat*'s pre-eminent digit-spewer, Jeremy. Laird's typically effusive and uncompromising guide to all things CPU, starting on p66, contains more statistics, tables and Art Department-baiting graphs than NASA's central computer. Probably. Thankfully, Jeremy's radiant prose style means its also a dashed good read. If you're in the market for a new CPU, you've *got* to read it.
Achievement of the month Making sense of an amount of raw data that could have killed a lesser man.

Front**end**

THE BEST OF THE MONTH IN COMPUTING

Eye Candy
Racy number

The Silverstone case is perfect for **www.directfrom.com**'s Hybrid Gamer, which packs more thrills and speed than Schumacher and chums could manage in a year. There's a 3.46GHz Pentium Extreme Edition in the engine bay and a terabyte of boot space.

Under the hood

3.46 GHz Pentium 955 Extreme Edition
4 x 1GB DDR2 Hyper
Radeon X1900XTX
2 x 500GB SATA HDD
Creative Soundblaster X-Fi Fatal1ty
Creative G500 Pro Gamer speakers
20-inch LG Monitor
Silverstone TJ-05 case
2x DVD-RW
Logitech G7 laser mouse and Media Keyboard set

Holy mother

It's the heart of your PC, but when was the last time you gave some love to that motherboard? Hell, while we're on the subject, when was the last time you understood what any of it does? In our mammoth feature (p108) we help you bend your head around that most mysterious keeper of silicon.

A graphical revolution

With Vista comes the new DX10 graphical dawn, but why won't the new API be WinXP compatible?

Direct X 10 will usher in a new level of efficiency in graphics programming. As pixel shaders changed the 3D world from built-in hardware effects to a programmable, flexible construction set, so DX10 and unified shaders will open up whole new avenues of code. But not for everyone.

Unified shaders are a far more efficient system that allow any given pipeline to do a different job on any given clock cycle, rather than the dedicated pixel or vertex shader pipes laying idle when not in use. It's a key feature of DX10, and it will be Vista-only. We've been trying to get a definitive reason why you can't do unified shaders in XP from a number of sources, including ATI, NVIDIA and Microsoft as well as comments from some of the devs who'll be writing code for the new platforms. The answers have been less than compelling.

"The legacy period from XP is bound to be lengthy"

DRIVER ERROR
"[DX10] will require very different driver architecture, and that might be one reason why it is Vista-only, as introducing new architecture for XP may be quite difficult," says Ondrej Spanel, Lead programmer at BIS (the *Operation Flashpoint*). The root of the problem is that until now drivers for graphics cards have operated within the kernel space of the Microsoft system, effectively being treated as extra instructions from within the OS, rather than an app requesting access. The trouble with this setup is that kernel errors in the driver could then crash the entire PC. Vista has to be rock solid, so

Alec Meer
DOESN'T NEED HIS SPACE

It seems I'm no longer down with 'the kids'

I don't get MySpace. I mean, I totally grasp its mechanics, and appreciate the need for a blogging service that offers more than just filling a page with word-posture. But what I don't get is the degree to which people are using it to socialise – and when I say people, I mean teenagers. They're living out their whole lives on Myspace – which has me wondering where they actually socialise.

And that's what horrifies me – I've crossed the gap. Last week, I painstakingly explained to my father what an MP3 player is, and he only grasped it when I broke it down to a prosaic technical description: it's a hard drive with lots of files on it and a headphone socket. The concept of carrying your entire music collection everywhere, without having to swap CDs, he initially struggled to understand, and I'm just the same with MySpace – there's been a shift, and I've been left behind.

And that is understandable (I hope) – I've already lived out my youth, so I don't need a service that facilitates doing that. But for those teenagers that aren't captain of the football team, an online social group is an invaluable way to avoid feeling like an outcast.

graphics drivers are being locked out into the user space. This means that you simply can't write XP driver instructions for DX10.

The problem isn't that XP is incapable of running instructions for new features like unified shaders, it seems, but rather that MS's API isn't set up that way. So far we've seen nothing to say Microsoft couldn't do it, only that it hasn't. For example, a document provided to us by ATI explains that the graphics giant has been working on heavily modified Vista-like environment within XP in order to prepare for the Vista driver model. That begs the question; why can't an instruction set for DX10 be written that's XP-compatible? We're prepared to accept that it's impossible, but we've yet to be shown why by any of the parties involved.

card running in a XP rig (or rather you will, but they'll be using DX9 instructions, which is a little pointless). The conventional wisdom is that the hangover from XP will be very long, but ATI's still bullish. "Anyone who says they're a serious gamer will be on Vista within three years," claimed Rich Huddy, ATI's Head of European Developer Relations when we quizzed him about XP's legacy. He might be right. But publishers don't want to sell to 'serious' gamers, they want to sell games to everyone, and there's no way they'll allow their devs to deliberately cut out the massive market of gamers still using XP. What's more likely is that most games

Stunning views like this one are likely to be DX10-assisted and XP-only, but devs won't stop working with XP for a while yet.

"Developers won't be allowed to cut out the massive DX9 market"

will fall back on DX9 features, maybe with some extras for DX10 users (take the DX8/DX9 differences in *Half-Life 2* as an example). Ports of Xbox 360 games may well be DX10, and hence Vista-only, thanks to the similar unified shader technologies at work on the console, but perhaps that's

WAITING GAMES
For now it means that you won't see any unified shaders on an XP rig. You won't get DX10 graphics

been Microsoft's plan all along. With ATI making chips for the console there's certainly no doubt about the close partnership. "Why won't DX10 work on XP? In my opinion the main reason is because MS wants to force people to upgrade to Vista," claims Jakub Gajda, Engine Programmer at Altar (*UFO: Aftermath*). But developers are desperate to take advantage of the enhanced flexibility and power DX10 offers. "It is truly revolutionary," says Filip Doksansky, Lead Programmer at Black Element Software (*Alpha Prime*). "Thanks to massive flexibility, it could unleash

GPU power for many tasks which were impossible before. It also frees developers from writing many code paths according to certain hardware capabilities. But we think it will take time until there will be a large enough DX10 market." That gap between games moving forward and the established DX10 user base may be the pressure that forces MS to make a DX10 API for XP. Remember, it's not like upgrading from DX8 to DX9, where a new graphics card that supports the API will do. Now you'll need to buy the new hardware *and* the new OS, and that may be a bridge too far for most gamers. **PCF**
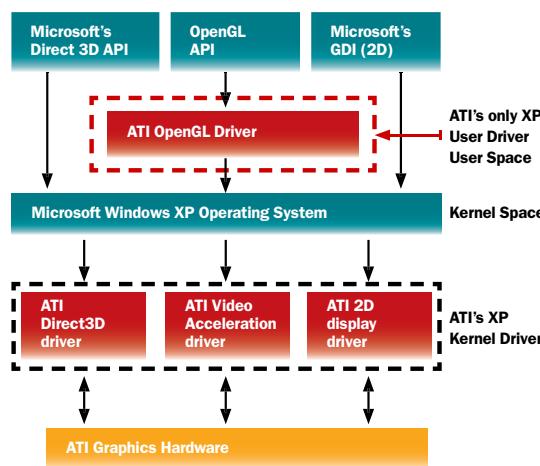
The driver model under Windows XP. The graphics card driver has access to kernal space which is potentially unstable.
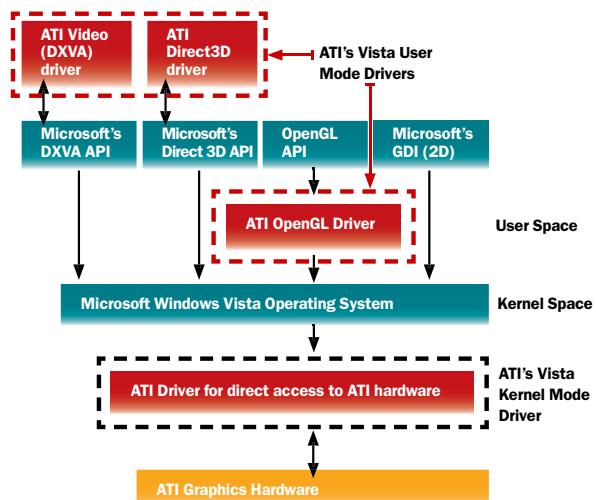
This diagram show the Windows Driver Display Model under Windows Vista. Drivers are locked out into user space.

Four play

AMD Quad-CPU systems on the horizon. Intel shrugs

When dual-core CPUs came along, they removed the necessity for dual-CPU systems – most commonly found in servers and workstations using Xeon and Opteron chip technology. However, AMD recently announced a range of quad-core systems, which it has dubbed AMD 4x4 – in which a pair of dual-core CPUs sit alongside each other.

The interesting fact to consider is that the company has announced these systems for the consumer market – and by that, you can be sure it means games rigs.

However, few enough games are coded to take advantage of two cores – let alone four. The likely result is a machine that's a tremendous multi-tasker, able to encode and decode video, download stuff and more – without an appreciable performance hit on games framerates. 4x4 is very much a stop-gap measure though, as AMD is to follow up later in 2007 with a true quad-core CPU. Intel has

announced the same. its first quad-core Intel chip, codenamed Clovertown, is due to ship to manufacturers at the tail-end of 2006, with general commercial availability in January 2007.

For the time being, Conroe will rule the roost. Intel's at the top of its game at the moment, and its new core has already wrested the games-performance crown from the Athlon 64 X2. Skip to page 66 to find out just how powerful it is – and why you need one.

Outlawed iTrip pardoned?

Lib Dems getting down with the iPod generation

The ban on gadgets which transmit the iPod's output to an FM receiver is being reconsidered by UK communications regulatory body, Ofcom. The iTrip was first banned in this country just under three years ago under the Wireless Telegraphy Act 1949 which bans the use of unlicensed radio equipment in the UK.

Liberal Democrats' spokesperson, Lorely Burt, raised the issue in parliament with Ofcom replying saying they were looking into it. Clayton Hirst of Ofcom is quoted on the BBC saying that they are "working with other European administrations to develop a common set of standards to allow some low-power devices to be sold and used in the UK".

Unfortunately for owners of such illicit devices, the current crop of transmitters won't meet these 'standards' and will still be outlawed, meaning that iTrip devotees will have to invest in new gadgets.

We bet Menzies Campbell will be after one of these…
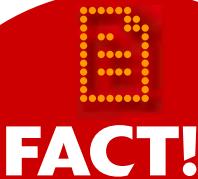
FACT!

The world's first clinic aimed specifically at games addiction has opened in Amsterdam. We, of course, could stop any time we want – we just don't want to.

Pirate wars

Two leading filesharing sites have their collars felt by the law but ripping CDs is, er, legal-ish

AllofMP3 has been accused of paying nothing to artists.

The Pirate Bay is, arguably, the public face of underground Bittorrent use. The Swedish site has for some time laughed in the face of demands by movie and music biz lawyers to cease and desist. At the end of May, The Pirate Bay disappeared, with reports that Swedish police had swooped and confiscated PB's servers. "This is a very important development for Sweden, a country which has recently acquired a reputation as a haven for copyright infringement," boasted John Kennedy, CEO of record industry body the IFPI. However, TPB promptly set up shop again in the Netherlands and is enjoying more users than ever thanks to its bolstered media profile. The MPAA has gone after several other sites since, including threatening legal action against another Bittorrent luminary, ISOhunt, which has previously had its users contribute generously towards potential legal costs. Meantime, infamous paid MP3 retail site AllofMP3, despite being ruled legal in its own country, has been officially classified as illegal by the British Phonographic Institute, which intends action against it. AllofMP3 staunchly defends itself but there have been American threats that if Russia doesn't deal with it and industries like it, its pending membership to the World Trade Organisation could be at risk. In better news, the BPI has said ripping CDs to your MP3 player is now acceptable. BPI Chairman Peter Jamieson said, "Traditionally the recording industry has turned a blind eye to private copying and has used the strength of the law to pursue commercial pirates. We now need to... make it clear to the consumer that if they copy their CDs for their own private use ... we will not pursue them." Well, thank you.

Border control by proxy

When your own elected government's resources are stretched by a steady influx of illegal immigrants across your borders, what do you do?

Do you task it out to local curtain twitchers by arming them with webcams? If you're the Governor of Texas, you spend $5m creating a virtual perimeter along your state's border with Mexico. The cameras are fitted with night-vision and motion detectors that can be monitored over the net. The site also has a freephone number, allowing wannabe vigilantes to report dodgy border crossings to the authorities.

So now Cletus and his tooled-up cronies can mobilise much more efficiently to enjoy their favourite sport – peppering illegals with buckshot.

Lo-Fi

Bad meeting, poor weather, lousy traffic. It's going to take hours to get home and I have to put up with dreadful sounds from my in-car entertainment system.

Man-machine interface

Now that every last inch of the human body has been pierced, skin-modders are resorting to increasingly bizarre abuses of their birthday suits.

Now the latest fad is a potential boom for the hardcore PC users – implanting a magnet into the tip of your ring finger, granting a sort of sixth sense for electromagnetic activity. Pass near,

say, a live cable, or a shop security tag sensor, and you'll feel a sort of buzzing sensation – so you could know in advance if a power surge was about to knock out your PC, or a hard drive was about to fail.

Frankly, it's not something we're about to try for ourselves, but find out more at tinyurl.com/l5zba, you never know, it could come in handy.

22% STAT!

The amount of commercial software that will be replaced by open source applications within the next five years, according to Gartner.

wøøt

Anti-DRM protests
Protesters took to the streets of San Francisco to moan about Apple's DRM. That's the stuff. defectivebydesign.org

HDMI is go
The first ATI and NVIDIA cards with HDMI sockets, begin to crawl towards mass production.

Ubuntu
The latest version has gone live, and it's splendid. Grab it from ubuntu.com or next month's coverdisc.

The Catalyst Control Center
ATI's bloatware is more of a bugbear especially now it doesn't provide the old control panel.

iPod sweatshops
Apple pays Chinese workers £27 each a month to make iPods.

Apple vs Creative
Suits and counter-suits are flying back and forth. We want healthy MP3 player competition, not legal bickering.

møøt

Get Windows Vista for free
Microsoft offers gratis OS for a year

After a couple of frankly flaky betas and widespread speculation that its 'early 2007' release date carried more than a whiff of bovine faecal matter, Microsoft has coolly presented the finger to the haters.

The more stable Windows Vista Beta 2 is now public – and free, complete with product key, to

anyone who wants it. It'll time out after a year, which is a decent clue as to when the final version will go on sale. *PCF*'s impressions? There's no new functionality to speak of (though DirectX 10 is included, but its shininess can't be gauged until we have DX10 graphics cards too), but it's a better performer than the last beta we looked at (see *PCF188*). Heck, we even won a round of *Quake IV* using it, though the framerate remained messy. But laden with *Firefox*, *Thunderbird*, *OpenOffice* and T*he GIMP* (compatibility problems with *AVGFree* barring our holy quintuplet of essential free software), it's a comfortable experience.

Want to try it? Head over to **www.microsoft.com/windowsvista/ getready/default.mspx** – you have the choice of either 32 or

64-bit versions, and to pay for a copy to be shipped to you on disc if you can't stomach a 3.5GB download. Driver support is patchy – ATI and NVIDIA provide 'em, but unless you have a progressive motherboard manufacturer, don't be surprised if you end up with no sound or complaints about unknown storage controllers. Maybe just pop it onto your spare PC for now…
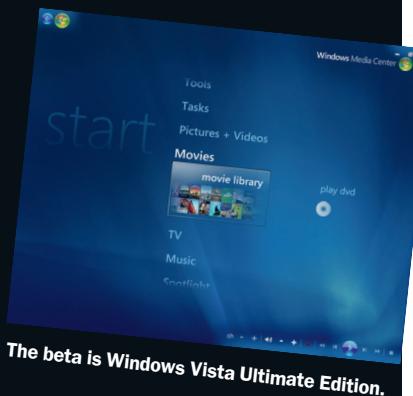
The beta is Windows Vista Ultimate Edition.

[Alt] + [Windows] brings up the live preview.

Google gossip

Keeping an eye on the latest news from Googleplex beats any TV soap for drama

This week in **GeastEnders,** a new spreadsheet causes controversy. Meanwhile on Goronation Street, rumours of a browser are denied, but fortunately the residents of Gemmerdale are gearing up to release a PayPal rival. Let's face it, the actions of the only search

Google Spreadsheets isn't live yet, but sign up for the beta at the URL above.

engine worth a damn are usually more entertaining than the latest from Albert Square's sour-faced denizens.

Speculation has been rife for months about whether Google is going to take aim at Microsoft. Rather quietly, it's happened – though with the whimper of a spreadsheet rather than the browser or OS bang many had predicted.

Mere days earlier, Google officially denied it was working on a browser of its own, claiming there was plenty of choice out there already, so the announcement of a quasi-rival to *Microsoft Excel* is something of a surprise. The hook is that *Google Spreadsheets* (**www.google.com/ googlespreadsheets/tour1.html**) is entirely online-based, operating through a browser, thus guaranteeing a very genuine form of the multi-user document collaboration Microsoft always touts as an essential feature of every new *Office* version.

It's a very basic affair compared to a full version of *Excel*, but with its core functionality, ability to save to .xls format and, of course, the fact you can access it from any internet-enabled PC, regardless of what software's on it, it's certainly an upsetter for any similar plans Microsoft may have.

ON THE BLOG

Bookmark blog.pcformat.co.uk. You never know what you may learn…

Bunny boilers

As well as holding a vast number of technology patents, Intel has a few weirder trademarks – such as the term 'BunnyPeople' referring to the name popularly given to chip engineers dressed up in their dust-free protective suits.

Satire is dead

Play the official West Yorkshire Police videogame, *City Zones*, which teaches you all about urban decay, the loss of civic pride and the state of life in deprived areas of the country. Hoo-boy.

Death by Warcraft

Check out the blog's May archive for details and photos of the chap who almost took a bullet to the head while playing *World of Warcraft*. Seriously.

Microsoft vs JPEG

Big Software Daddy has announced a rival compressed picture format, *Windows Media Photo* – can it possibly hope to take down JPEG as the internet's fave image type?

BIG
QUOTE!

"[It is] ridiculous that 1940s legislation is preventing the iPod generation from enjoying their music using the latest gadgets." Don Foster, Lib Dem Shadow Culture Secretary.

Net neutrality update

Master Chief tries to save the Internet. Fails

Start hoarding your bandwidth folks – the golden age of net neutrality may be coming to an end after all. After fervent lobbying from giants like Google and eBay the effort to protect the principal of net neutrality (ie that all data is treated by pipe providers equally) has failed. Last month the House of Representatives in Washington voted against a proposed Amendment during a larger debate on an Act entitled the Communications Opportunity, Promotion and Enhancement Act, a title that sums up the graspy motives behind this attack on a fair and free internet all too well.

A massive body of support for the net neutrality principal, ranging from movie stars and musicians to grassroots movements like Save the Internet and **www.democraticmedia. org**, had tried desperately to convince the powers that be that the current equality of the net is precisely why it's been such a commercial success story, but their cries have fallen on deaf ears. US Democrats had even taken to using the Halo-based machinima talk show *This Spartan Life* (**www.thisspartanlife. com**) to convince other politicians that a stand needed to be made, passing around an episode about net neutrality to members of the committee in order to rally support. The virtual talkshow (hosted by a Master Chief look-alike) regularly features high-profile guests like Korn and the legendary Sex Pistols manager Malcolm McLaren, but even these extraordinary measures seem to have been in vain. Perhaps on reflection using a videogame medium famous for featuring punk and rock veterans to get a bunch of suits on your side was a little optimistic… At any rate, the route to a tiered internet is now wide-open for the service providers. If no Amendment can be made, then it's essentially an official endorsement for a toll-gated superhighway. There's still hope, though. The matter now moves on to the US Senate, where yet another round of debate will either save net neutrality, or seal its fate once and for all.

Master Chief fought in vain for truth, justice, and the American information superhighway.

Geared**up**
THE HARDWARE ON OUR MOST WANTED LIST

Jeremy Laird
THE LONELIEST NUMBER

AMD brings dual processing to your desktop

Call me a miserable cynic, but I reckon AMD's new 4x4 platform is the work of a company that knows it's about to take a beating. For the uninitiated, 4x4 amounts to little more than adding a second CPU socket to the desktop PC platform. Now, you could say it's a clever move that plays to AMD's strengths. The Athlon 64's on-chip memory controller and system I/O deliver far superior multi-chip performance scaling than Intel's CPU-plus-northbridge approach.

But just as NVIDIA's Quad SLI is an attempt to obscure the fact that ATI currently tops the table for PC graphics grunt, surely 4x4 wouldn't exist if Intel wasn't about to wheel out a world-beating new family of processors.

In PR terms, however, I reckon 4x4 will be a winner. Choose the right benchmarks and there's little doubt it will deliver unbeatable performance. And for your average US PC enthusiast with more money than sense, two is always better than one. It's that kind of simplistic reasoning that has seen the dubious merits of SLI translate into millions of motherboard sales for canny old NVIDIA.

Small wonder
⬇ AOpen MiniPC Duo MP945-V
Price £604   **Available** Now   **Web** www.aopen.com

This may be embarrassing to admit, but it was Apple's Mac Mini that really put the small into SFF home computers. And it was AOpen, of course, which proved the most shameless rip-off merchant among the bare-bones PC specialists by rapidly wheeling out the MiniPC. But with the second generation MiniPC, AOpen has not only carved out its own unique aesthetic identity. It's also given the MiniPC a feature set that makes the Mac Mini look like a rather mean-spirited machine. Heading up the media-friendly spec list is a full range of video-out ports including DVI and VGA (via an adaptor) and a proprietary Mini-TV port, which delivers S-Video, composite video, and component video via a single dongle. Add in a motherboard upgrade to Intel's 945 chipset and support for the full range of Core Duo processors and you have an awfully appealing pint-sized package.

Price parity
It may not look exactly like a Mac Mini anymore, but at £600 for the 1.66GHz Core Duo model, the price remains a dead ringer for a similarly specced Apple box.

Stingy storage?
The MiniPC ships with a slightly stingy 80GB 2.5-inch hard drive. But you can fix that in a jiffy by dropping in one of Samsung's new 200GB laptop drives.

Mini media centre
The full retail package comes complete with Windows XP Media Centre Edition. However, you'll need to add a USB tuner if you want to watch the big box via this mini PC.

Seriously small cinema
With 5.1 channel audio and a full range of video-put options, the latest MiniPC is a genuine home cinema contender.

Heat beater
➡ Zalman CNPS9500-AM2
Price £39 **Available** Now   **Web** www.quietpc.com

We've said it before, and we'll bally well say it again. If you're remotely interested in efficient, unobtrusive PC performance, don't go cheap and cheerful with your choice of CPU cooler. Whether it's extreme overclocked shenanigans or stock performance with massively reduced noise and operating temperatures, a decent heatsink such as this new Zalman model will utterly transform your prized proccie. As for the CNPS9500-AM2, its claims to fame, other than being bigger than your house, is support for AMD's new AM2 chips and a nickel coating to snazzy-up the heat-conducting copper innards.

Rapid RAM
↑ Corsair EPP DDR2 memory
From £52 **Available** Now **Web** www.corsairmemory.com

With stock headline data rates now up to 800MHz, DDR2 memory offers enormous bandwidth on paper. In practice, however, the advantage over old school DDR memory running at 400MHz has been slim to none. And the blame for this shortfall lies squarely at the door of the high latency characteristics of most DDR2 memory. But no longer. Corsair claims its latest 800MHz DDR2 DIMMs boast the lowest latency on the market thanks to timings of 3-4-3-9. Corsair has also included support for the new EPP (Enhanced Performance Profile) open memory standard which works with compatible motherboard chipsets to ensure optimal memory performance.

Good book
→ Apple MacBook
Price £749 **Available** Now **Web** www.apple.com/uk

Another month, another MacBook. But if the all-alloy MacBook Pros are simply too expensive for most mere mortals, the new non-Pro placcy Maccy is much more affordable. However, in terms of build quality and pure desirability, this 13.3-inch glossy screened, wide aspect-toting system is still a cut above the usual Wintel fare. And with familiar Intel Core Duo-powered gubbins on board and Boot Camp allowing full Windows XP compatibility, there's no doubt the MacBook will be a punchy performer. Our only doubt involves the retention of the traditional single-button Apple trackpad. You'll need to plug in an external mouse to acquire essential right-click capabilities.

Dell-ectable
← Dell XPS700
Price £1,198 **Available** Now
Web www.dell.co.uk

It's been an awfully long time coming. But bargain system-supplying behemoth Dell is finally leveraging its massive financial might to produce some seriously desirable PCs. For starters, the new XPS 700 sports a beautifully constructed alloy chassis that exposes Dell's own in-house Alienware competition for the chintzy plastic lash-ups they so surely are. However, there's also function to go with the fabulous form, thanks to a free-flowing front-to-rear cooling arrangement. Nevertheless, at launch the XPS 700 is fitted with Intel's outgoing Pentium D processors. So, we'd heartily recommend that you wait for the inevitable Core 2 Duo upgrade before pulling the trigger and plumping for one.
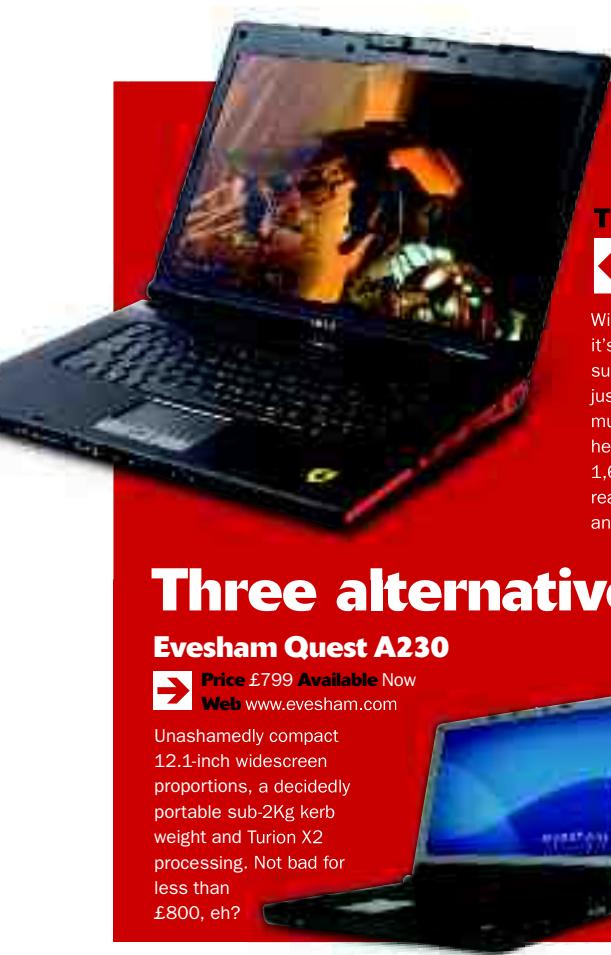
PREVIEW
AMD TURION LAPTOPS

Tifosi's choice
Acer Ferrari 5000

Price £TBA **Available** Late Summer **Web** www.acer.co.uk

With Intel making waves with the new Core 2 Duo chip and AMD battling back with the 4x4 enthusiast platform, it's easy to forget there's a new mobile processor in town. The AMD Turion 64 X2's main claim to fame is unique support for 64-bit data processing from a dual-core mobile CPU. But with clockspeeds topping out at 2.0GHz and just 512K L2 cache per core, we're not sure Turion X2 has what is takes to beat Intel's current Core Duo dualie, much less the all-new Merom laptop chip due out at the end of August. Nevertheless, the first Turion X2 systems are here and this Acer unit is perhaps the most intriguing of all. Headline specs include a 15.4-inch 1,680x1,050 widescreen LCD panel, carbon fibre chassis and ATI Mobility Radeon X1600 256MB graphics. But the really interesting innovation is a next-gen high definition video package which includes a slot-loading HD-DVD drive and an HDMI port complete with HDCP support.

Three alternatives…

Evesham Quest A230

Price £799 **Available** Now **Web** www.evesham.com

Unashamedly compact 12.1-inch widescreen proportions, a decidedly portable sub-2Kg kerb weight and Turion X2 processing. Not bad for less than £800, eh?

MSI MS-1058

Price £800 **Available** Now **Web** www.msi.com.tw

Same chassis and ATI RS485M chipset as the Evesham Quest A230. But also available as a bare-bones system, allowing you to spec her up to your heart's content.

HP Pavilion dv2000

Price £800 estimated **Available** Now **Web** www.hp.co.uk

A stylish notebook from the dreary drones at HP? Yup. And with Turion X2 power, a glossy 14.1-inch display and GeForce Go 7200 graphics, a handsome performer, too.

ANALYSIS

CONROE CONQUERS
BUT INTEL FLOUNDERS?

Core 2 Duo, the chip formerly known as Conroe, is a killer. So good, in fact, AMD has resorted to the rather desperate measure of launching the dual-socket 4x4 platform in hope of clawing back some of the lost ground. But wouldn't it be ironic if Conroe arrived at the precise moment that Intel fell from grace as a company?

Yes it would. And it's just possible that's exactly what is happening. Earlier this year, the silicon giant's head honcho Paul Otellini announced a range of measures designed to turn the good ship Intel around, including 16,000 redundant or redeployed employees and a promise to close or sell off non-performing areas of its business.

In June came news that Intel had decided to flog several non-PC processor families to the highest bidder, including the Xscale CPU found in many PDAs and the IXP range of network and communications chips. What's more, many of the industry's most respected chin-scratchers reckon it's only a matter of time before Intel's loss-making flash memory division gets the chop. And that's not even mentioning the money pit that is the Itanium enterprise class processor and platform.

All of which may have you wondering whether *PCFormat* has transmogrified into *SemiConductor Weekly*. But bear with us. Because although we care not a jot about the finer details of Intel's broader corporate strategy, it does have a knock on effect on the stuff we really care about – PC processors. On the one hand, a significantly leaner and meaner Intel might be more inclined to focus fully on producing the world's finest desktop CPUs. On the other, a smaller, sicklier Intel might be less able to push ahead with the ground-breaking but breathtakingly expensive technical developments, including ever tinier manufacturing processes, which are the very stuff of PC progress. Time, and the company's balance sheet, will tell.

The Conroe chip is sure to reverse Intel's fortunes.

Intel's barmy army. "We're afraid we can't let you do that, AMD."

Gameslatest

FRAGTASTIC MYSTERY AND INTRIGUE

No matter what that logo says, all this was done without an Ageia Physx card or loss of framerate.

James Carey
TECHNO-FETISHIST

Welcome to my first-person shooter nest…

It's a pretty well-known fact that I am a bit of a geek when it comes to my home rig. I have an X52 joystick/throttle combo strategically placed to simulate a cockpit. I have a TrackIR 4 on my three-monitor array, I have EL wire running across the edge of the desk to bathe my fingers (and keyboard) in an eerie blue glow, I even have two satellite speakers gaffer-taped to the back of my chair for surround sound.

I've set about creating the ultimate gaming grotto in the corner of my living room. Still, all this is useless if the games I play on them aren't up to the job. That's why I'm all mixed up about the future. With DX10 and unified shaders on the horizon and physics beginning to become a given rather than a hopeful dream, a new age of gaming realism is dawning, and that's exciting. But when DX10 is Vista-only and the legacy of XP is bound to be double that of Win98, will any publisher (other than MS) alienate a squillion gamers by making DX10 only games? Will the possiblility be squandered by people who can't offer the niche appeal of DX10? I fear it will…

Who needs PhysX?

Flagship PhysX game *Cell Factor* can be played without the 'required' Ageia card

DUE DATE TBA
PUBLISHER Ageia
DEVELOPER Artificial
WEB www. Cell Factorgame.com

Cell Factor, Ageia's 'PhysX-dependant' shooter can be played without a PhysX card installed. The *Cell Factor* demo represented proof, we thought, that PhysX was

"There's still a case for taking physics processing off the central CPU"

viable. Some fellows over on **www.hardforum.com** had other ideas, though.

It seems that by adding 'EnablePhysX=False' to the command line of the demo, you can remove the need for a card. We couldn't believe it until we benchmarked it ourselves. But surely Aegia's card was doing *something* useful? The we spotted it. The waving cloth and liquid effects were missing. More poking around in the .ini files revealed that adding 'PhysXHardwareCloth=False' to the command line gets the cloth working as well albeit at a low framerate.

So what does this mean for Aegia and PhysX?

In the short term, the result is disastrous for Ageia; in the long term, as game environments get more complicated, it still means there's a case for taking physics off of the CPU and putting it on either the GPU or a separate co-processor. No-one ever said that physics couldn't be done on a CPU/GPU set-up. Yhe argument was always if we're to have gameworlds in the future that are filled with flowing clothes, babbling rivers and mist that curls around our feet, we need some bespoke physics grunt. Whether that grunt needs to come from a PhysX card, rather than DX10 on a second GPU (or even *third* if ATI's recent comments are anything to go by) is still the real question. Which leaves us where we were before – PhysX cards are cool, but don't buy one yet…

GOSSIP!

"What users were not aware of is that without the PPU there is no cloth, no fluids, and there are FPS hits during peak rigid body activity." Peter Evers, Ageia spokesperson.

One of the only effects in the *Cell Factor* demo you *can't* get without a PhysX card. With goo here, and left, without.
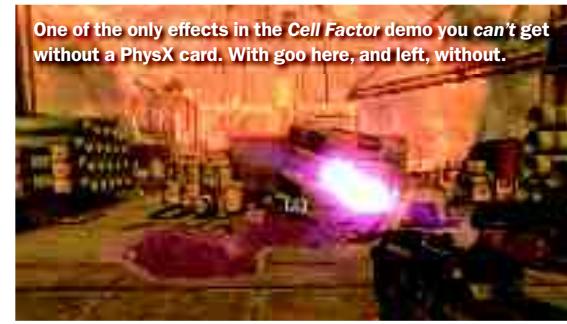
"Sam has to take down terrorist organisations from the inside"

A double entendre

Our hero joins the dark side in *Splinter Cell Double Agent*

DUE DATE September **PUBLISHER** Ubisoft
DEVELOPER In house **WEB** www.splintercell.com

The muddy world of international espionage gets a whole lot dirtier in this next instalment of the *Splinter Cell* franchise. The covert infiltrate and execute action of the first titles is augmented by some serious insider trading. Playing as a double agent for the NSA, Sam Fisher has to take down those dastardly terrorists from the inside out.

What this means in real terms is that you aren't totally reliant on the drip-feed of objectives handed down from on high that you previously were; now it's a case of thinking on your feet and weighing up who to betray and when. Do you execute an innocent to stay in with the bad crowd or do you risk discovery and death by slicing and dicing terrorists at will?

There's good news too for us PC fans as the weight of community power strikes again. Originally, the Spy vs Mercenary multiplayer was to be exclusively found in the Xbox 360 version, which left PC owners only with the straight Spy vs Spy game. However, thanks to popular demand however it is now being instated into the PC game. Gawd bless forums.

Betray terrorist scum for kicks and profit in the next instalment of *Splinter Cell*.

in the pipeline

Doc Brown said you should never know your future. Look what happened to him

AUGUST

Jagged Farm: Birth of a Hero
Pigs might fly. They may even drive tanks in this Orwellian nightmare of an RTS. Using the *Officers* game engine, *Jagged Farm* sees a group of highly organised pigs starting on humanity. **www.gfi.su**

AUGUST

Dungeon Cleaners
Despite the title this Russian RPG is more in line with *Fallout* and *Jagged Alliance* than *Dungeon Siege*. We have been told by devs 1C that it will be released outside Russia, but it hasn't as yet confirmed a publisher. **int.games.1c.ru/dungeon_cleaners**

Company of Heroes
A year on from winning the Critics' Choice award for Best Strategy Game at E3 last time around, the hotly anticipated RTS is once again in the running for this year's award. Maybe they'll get around to releasing it too. **www.companyofheroesgame.com**

SEPTEMBER

Beta eater

Stick your oar into the future of MMO gaming

This month we've delved into the brutal world of Aquilonia, where mythical creatures and lost civilisations rub shoulders and Conan the Barbarian is king. Yes, we've got you secured places on the upcoming Autumn beta test for **Age of Conan – Hyborian Adventures**.

Be still your beating hearts too if you thought you'd missed out on the opportunity to get in on the beta test for one of the most eagerly anticipated MMOs of recent times, Lord of the Rings Online. We've still got a few places left on the test, also starting in the Autumn, so get in quick and you too can get questing with your very own fellowship.

To enter a draw for one of the beta keys we have on offer just answer this simple question and let us know which games you want to get at.

Who played Conan the Barbarian in the movies?
a) Tom Arnold
b) Matsumoto "Arnold" Takahashi
c) Arnold Schwarenegger

After a hard morning's slaughter, Conan kicked back.
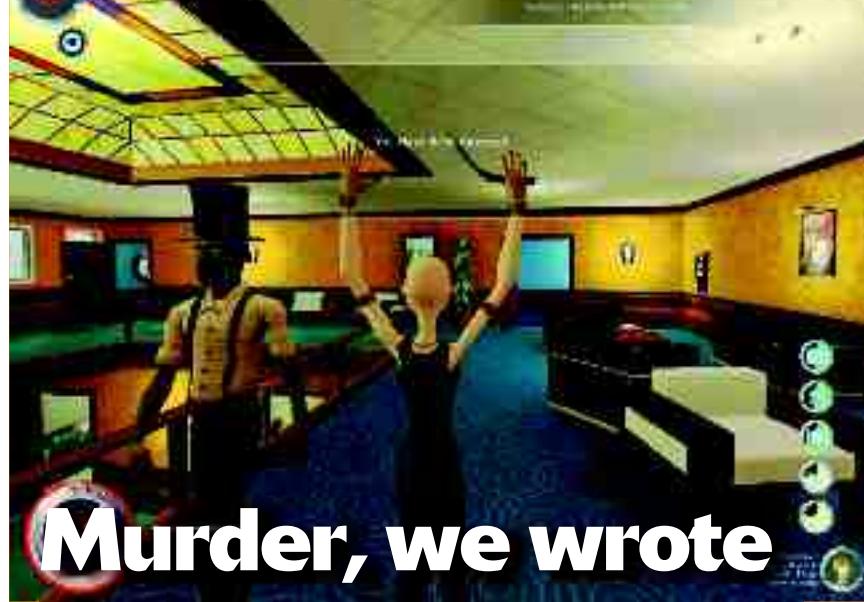
Murder, we wrote

It's all going a bit Agatha Grisly on *The Ship*

DUE DATE 15th September
PUBLISHER Mindscape
DEVELOPER Outerlight
WEB www.theshiponline.com

Cruises are synonymous with elderly folk and failed entertainers, with the only excitement coming from the occasional bout of vomiting or shuffleboard. Things were very different in the Thirties, when cruises were filled by ne'er do wells being paid to off each other. At least that's what we've learned from *The Ship*.

The urban myth is that *The Ship* originated as a *Half-Life* mod which got picked up by an astute publisher. The reality is that Outerlight always had this release at the forefront of its thinking.

You play a passenger given a free ticket on a cruise of your choice by the mysterious Mr X, in exchange you must take part in his hunt. You are assigned another passenger to assassinate and must find a weapon, your target and execute them for monetary gain. Sounds easy? Well, it would be if you didn't have to do it without witnesses, guards and olde worlde security cameras taking notice. Wander around with a fire axe and you'll be slammed in the brig faster than you can sing *The Love Boat*.

You also have to remember to look after your own wellbeing as one of the other passengers will be after you with similarly nefarious intent. To complicate matters further, your character has all the needs that a real person has to suffer through, such as personal hygiene, bladder emptying, sleep and even mental health. You must take care of these issues in order to be a fully functioning killer, but be warned: you will be vulnerable while you do.

The multiplayer version with the singleplayer arcade practice mode should be available for download on Steam as you read this, with the full game containing the story mode due for release in September. Check out **blog. pcformat.co.uk** now for our definitive review.

Lady Astor didn't realise that her opponent had choked on poisoned chalk.

SEPTEMBER

Dawn of War – Dark Crusade
What is looking like the final expansion to the *Dawn of War* franchise adds the Tau and Necrons to make up seven playable races. You won't need *Winter Assault* to play, but will miss out on the Imperial Guard if you don't. **www.dawnofwargame.com**

AUTUMN

Empire at War: Forces of Corruption
The endless battle between good and evil can be less than rewarding, so this first expansion to the Star Wars RTS sees you taking the middle ground and setting up as a corrupt rival to Jabba the Hut. You scoundrel... **www.lucsarts.com**

WINTER

Sabotage
Sneaking under most people's E3 radar came German publisher dtp's third person shooter. Your character's not just another one-dimensional beast, but is actually based on real WW2 resistance fighter Violette Szabo. **www.sabotage1943.com**

Is this the next big thing?

A *Heavy Duty* claim indeed, but you'll believe us soon…

DUE DATE Early 2007 PUBLISHER Akella
DEVELOPER Primal Software WEB www.akella.com

Games very rarely spring from nowhere and grasp us jaded hacks firmly by the lapels, but that is exactly what happened with Akella's *Heavy Duty*. It's a squad-based action real-time strategy outing, much in the vein of *UFO*, requiring you to protect your planet from hostile invasion by setting up your own fast-response defence network.

Touting such innovations as a fully realised planet with no fog-of-war, just a horizon, new phraseology like Inverse Kinematics and Terramorphing and the fact that it stores the gameworld in RAM for practically instant access, we just had to take a closer look.

It's a turf war, on a global scale.

Talking code

Primal Software's developers spill the beans on the interplanetary RTS

PCFormat: What is it that sets Heavy Duty apart?
Primal Software: We are the first company in the world that actually stepped up from small flat game areas to a real, round planet with all its features: climate zones, weather, day-night cycle, etc. It was not easy, after all, the only competitor here is Will Wright with Spore, and his planets are way smaller and less detailed.

PCF: We heard talk about a 150km² planet, is that the case?
PS: Nope – it's more than 300 square kilometres actually. There are no technological limits for the engine; basically, making the real, full-sized Earth is not a problem.

PCF: What benefits will the players get from having the game world stored in RAM?
PS: Zoom out from the planet to view it from its

Primal Software: Slartibartfast not pictured.

orbit, and you'll see it all: huge seas reflecting sunlight, mountain ranges crossing the continents, etc. No loading screens, no hiccups while the data loads from the hard drive, just a smooth and pleasant movement.

PCF: What exactly is 'Inverse Kinematics'?
PS: There are no animations at all for the robot's legs and feet; each of them is controlled by a complicated real-time algorithm. This lets the robot climb almost vertical walls, target enemies over edges of high cliffs, hide in craters and do it all extremely gracefully.

Check out this month's coverdisc for the trailer and the incredibly detailed four-page Q&A with Primal Software for the full lowdown on Heavy Duty. Read more at blog.pcformat.co.uk.

Euro trash

Runaway makes it to the UK for the first time

DUE DATE Autumn
PUBLISHER Ascaron
DEVELOPER Pendulo Studios
WEB www.runaway-thegame.com

For reasons best known to original publisher GMX, the first *Runaway: A Road Adventure*, never made it to these fair shores. Despite this fact, it was still one of the biggest-selling point-and-click adventures of 2003 across the rest of Europe, shipping an impressive 600,000 copies.

Ascaron has taken the plunge and is handling the distribution of the title in the UK, so we'll all be able to get some sweet adventure game lovin'. Based around the adventures of Brian the timid student and Gina the ex-stripper, the game is full of adult humour, pop-culture references and gloriously colourful, cartoonish backgrounds. Oh yeah, and lemurs, pirates and polar bears too…

The adventures of a meek student and an ex-stripper, you say? Where do we sign?

NWN RIP

Long live *Neverwinter Nights 2*

DUE DATE September
PUBLISHER Atari
DEVELOPER Obsidian Entertainment
WEB www.nwn2.com

Barely two days after releasing the latest Premium Module for *Neverwinter Nights*, *Infinite Dungeons*, Atari announced it was ending support for the *D&D* RPG. The result isn't just that there are to be no more official patches, which is expected as *NWN2* looms on the horizon, but the Premium Module system for selling official mods is also being canned.

There is consternation among the fanbase because of the amount of mods still that now will not be released. Rumour-mongers are blaming Atari's finances or the company not wanting horses to appear in-game before *NWN2*. Realistically, though, the closure of the scheme is no bad thing for consumers, as most of the modders are still likely to release the fruits of their labours, they just won't be able to charge you. Sucks for the modders though.

The official response from Atari points out that most companies stop producing content at least six months ahead of a new release, not the three months that Atari have officially scheduled.

NWN2 is being created with modders in mind. It is backwardly-compatible, allowing moders to port large amounts of their original NWN data into the sequel. It has also refined this toolset to make it simpler for people to create their own individual worlds.

With the sheer weight of numbers behind the MMORPG explosion though, NWN2 is definitely going to have to enthuse the original's modders if it wants to stay ahead of its contemporaries.

NWN2 has been coded with hackers in mind.

UFO: Afterlight
After the mess that Earth found itself in after the previous games, *Afterlight* finds you in command of a human colony on Mars. Developer Altar Games is looking for more of an RPG feel as you terraform the red planet. **www.ufo-afterlight.com**

Halo 2
With Bungie's shooter sequel being Vista-exclusive, the concerns that it may also be DirectX 10-only have been rapidly, not to mention thankfully, quashed. So if you want to play this elderly sequel, you only need to upgrade your OS, not your GPU too. **www.bungie.net**

2007

Fury
The massively multiplayer online outing from Australian company Auran owes as much to Battlefield as it does to *WoW*. Touted as pure PvP, there's no grinding just furious action fighting against players, server versus server. **www. unleashthefury.com**

SPRING 2007

Hats off to the disc, doctor

James Carey discovers how the quadriplegic kids of Great Ormond Street play games with a little help from *PCF*

Doctor Nick Pickett is a Music Specialist at Great Ormond Street Children's Hospital. His PhD was based on helping severely paralysed patients gain a greater level of interaction with the world through music and technology. A keen programmer and tinkerer, Nick also designed and manufactured highly sensitive breath switches and software for his patients, the commercially available switches being too reliant on lung power, which is something many of the children in his ward at Great Ormond Street simply don't have.

It was this love of tech and programming as a student that brought Nick back to reading *PCFormat*. His early programs used a version of BASIC and ran on BBC computers. Dr Pickett saw the free version of *REALbasic* (**www.realbasic.com**) we ran on the cover of issue 185 and began to rework his old apps into the new, Direct X compatible *REALbasic*. At this point he contacted us and we began discussing his work. It just so happened we'd reviewed Naturalpoint's TrackIR 4 hardware in the previous issue and thought perhaps Nick might be able to use the head-tracking system with his kids, some of whom have no movement below the neck at all. We talked to the team at Naturalpoint, and they very generously agreed to donate one of their top-of-the-range SmartNAV systems to Dr Pickett (essentially an industrial version of the Track IR 4). It turns out this was the start of something rather exciting for Dr Pickett and the wards at Great Ormond Street hospital... **www.gosh.nhs.uk/**

PCF How did all this come about in the first place?
Dr Pickett I had a lot of programs from my doctorate days that were made using BASIC on a BBC. I wanted to convert some of them over to modern machines and the *REALbasic* software on your coverdisc was perfect. When you mentioned the Naturalpoint hardware I immediately thought of one quadriplegic patient, a three year-old girl who's very smart, very sharp, and the possibilities it could open up for her. Pre-school age is so important in terms of mental development and normally these kids don't get tutorage in these formative years. Without a means of interaction with the outside world a lot of these children suffer long-term development issues. Some of them may never be able to move below the neck so they need to learn [to interact] fast.

PCF How do the SmartNAV and your own inventions help your patients?
Dr P There are a number of commercially available units that do similar things and the prices vary enormously. The trouble with a lot of [interactivity aides] is they assume you can blow into a switch. Small children, ventilated kids, don't have the breath to activate them. I've developed a switch that replicates clicking the left or right mouse button, but works at extremely low pressures, and is activated by oral cavity vacuum or pressure rather than lung power. The *SmartNAV* has mouse emulation, but the trouble with young kids is a lot of the time they'd have no idea how to use a mouse anyway. So I've written a program in *REALbasic* that lets this patient use the Naturalpoint system alongside my pressure switch in a more accessible way. Using them together she can now play along with certain tunes by looking at an instrument on screen then 'blowing' the switch to activate the drums or cymbal or whatever she wants.

PCF You say 'this particular patient'. Is there any reason you couldn't use the system with other kids?
Dr P Each patient has to be treated as an individual case. They all have different levels of mobility. Because of a tracheotomy (a hole in the neck for breathing) for example, something that's just sensitive enough for one might be useless or frustrating for another. In principal you could get it working with some of the other kids but it's about resources. I've been putting these programs together in *REALbasic* in the evenings so it takes time.

PCF So how do you see this developing in the future?
Dr P Well, the arrival of the *SmartNAV* system has caused quite a stir here. In fact, having seen the unit working as I have it configured now, the Friends of Great Ormond Street Charitable Trust, one of the charities that supports the music provision in the hospital, has come up with the cash to buy more SmartNAV units for other patients. It's been really exciting getting these systems working for the kids and I'm already working on a second program that will allow the user to flip through the pages of a virtual book and select nursery rhymes to be played. It's made such a difference!"

Helping Dr Pickett with his fantastic work has been a genuine pleasure. We can't thank Naturalpoint enough for its generosity and aid. Naturalpoint has even put Dr Pickett in touch with The Escape Artists Charity (**www.escapeartists.co.uk**) which, working with the Engineering Department of Cambridge University is also developing different ways to enable severely disabled children to communicate through music. We wish him and his patients the very best of luck.

Details on how to make a donation to Great Ormond Street Hospital can be found at **www.gosh.org/donate/index.html. PCF**

How it works
Dr Pickett explains how the app developed

When she looks to the left of the screen, the drum player is highlighted. She then operates a mouth switch and the drum player bangs the drum. This sound is passed through an external amplifier, which gives a big bass drum sound. By looking at the right side of the screen she can make the cymbal musician play instead, and produce a mighty crash. This simple interactive program is an example of how SmartNAV can be used to enable disabled children to participate in group music sessions at the hospital. 'Joining in' is vital in these early stages.

Right: The SmartNav system in close-up.

Games for health

All over the world, games are making us happier and healthier

Games have had a huge impact on modern health care. Back in 2004, doctors at the University of Washington began using games as pain-relief systems for burn victims, resulting in the creation of the VR tool Snow World, where kids could play and escape while their wounds were treated. More recently research has shown that the improvements in hand-eye co-ordination provided by games greatly improved the accuracy of practising surgeons.

But it's as a learning tool that they have had the biggest influence, with games being used to teach youngsters about cancer, diabetes and even schizophrenia. Second Life's schizophrenia simulation has been created in attempt to teach people what sort of problems sufferers of the mental disorder will face. Although not particularly sophisticated, all these games provide a direct and friendly way for people to learn, and as a result have the potential to be enormously powerful.

Of course games can have more direct therapeutic effects, too. Researchers at Nottingham University expect to soon be able to use games to treat amblyopia, or 'lazy eye.' Meanwhile in the US the attention disorder treatments company East3 is developing game-tech to help treat kids with attention deficit problems.

It's tough for the developers of these games to find the time, money or technology to develop these projects, but tools like Second Life are making it easier. One SecondLife project, for example, is a virtual island designed to make life easier for people with forms of Asperger's Syndrome, plus many others that are currently in progress.

Watchthisspace

Jim Rossignol
GASSY NOBLE

JIM ROSSINGOL GETS LOST IN THE FUTURE

Lampost 2.0

Next-generation street furniture just wants to help

The future for lamposts is looking bright and Europe is leading the way in reinventing public lighting to meet the needs of 21st Century street life. The University of Dundee is installing solar-powered lampposts that use low-powered LEDs to light the street, while also acting as WiFi nodes. Not only will students enjoy an ecologically sound and well-lit walk back to their halls, they'll also be able to access their network from anywhere on campus.

Meanwhile, the city of Zoetermeer in Holland has started to install internet lampposts across its public spaces. The lampposts boast two LCD screens, one of which displays adverts and the other is a touchscreen delivering internet access to passers-by. The Dutch lamppost also supplies WiFi to net-enabled devices within a 100-metre range.

Britain's future lampots meanwhile are rather more vocal. Over 20 new street lights in North London will be able to guide blind or partially sighted pedestrians across busy thoroughfares. "It's a system that tells you where you are," explained electrical sign consultant Mark Rose. "For example, it tells you what road or crossroads you are on or what bus stop you have just got off at. While most vision-impaired users have good local knowledge, that is different from knowing where you are at a given time, or knowing the distance between places."

Elsewhere in London a more aggressive lampost is being deployed to take up its duties as a 24-hour security guard. A motion-sensitive module on the post includes a digital camera that starts taking photos as soon as it detects nearby activity, while at the same time using a loudspeaker to announce its intention to record the activity of miscreants.

Other street furniture is lagging behind the lampost, although developments in bollard technology are said to be making urban areas safe from large-scale terrorist attacks.

Whatever next? Talking manhole covers?

Soldiers love their robots

According to Colin Angle, the chief executive of military robot supplier iRobot, soldiers are rapidly developing emotional bonds with their mechanised chums. Thanks to the stressful conditions that combat entails, soldiers feel indebted when robots take a bullet for them. Soldiers have come to feel attached to machines, and become distraught when they are destroyed in action. "Please fix Scooby Doo, if you can because he saved my life," one soldier reportedly said of his bomb-disposing robot buddy. **www.irobot. com**

This month in
Science
June, 1900

July 2nd 1900 saw the flight of the very first Zeppelin airship in Germany. The age of ligher-than-air transport was ended by the cost of reparations to the Allies after WW1, as well as the US' monopoly on helium production.

Slingshot to space

Why use a rocket when a hypervelocity spiral cannon will do?

NASA wants to find alternative means of putting things into space. Rockets are expensive forms of self-propulsion. A ballistic launcher to fire an object into the sky without the need for onboard enfines would be far cheaper.The idea of using a cannon or other projectile system to get into orbit isn't exactly new – Newton came up with the same idea when he was figuring out the laws of gravity.

There are already some redundant ideas lying around, such Project Orion, which would have used nuclear bombs to shoot a giant spacecraft at the stars. Instead NASA is considering a giant slingshot. The device would be an immense spiralled tube which would spin at mind-curdling speeds, building up centripetal force before lobbing its payload into the heavens at around 8Km/s. The enormous g-forces would mean that the device would be no use for sending people into orbit (unless NASA wanted to send very flat people), but it could well reduce the costs of putting components for the space station or Mars mission by a drastic amount. **www.slingatron.com**

Not exactly like the slingshot you had as a kid…

Thewebpages

NEWS FROM THE NET

'Relaxation photography' apparently abounds on the internet. We're as stunned as you are.

CENSORED!

Porn wars

ICANN pulls the plug on .xxx website suffixes. ICM and courts not amused

The campaign to create a domain suffix for porn sites is stepping up, after the latest rejection by regulator ICANN. And now the law's getting involved. Porn! On the net! Who knew?

Florida company ICM Registry has been attempting to introduce the .xxx suffix for over a year. The rejection of the proposal raised eyebrows last year, when the regulatory group ICANN was believed to be rendered impotent after the influence of right-wing lobby groups on the governmental body. And now the proposal has been rejected a second time. By the magic of the Freedom of Information Act, ICM believe that it is now able to demonstrate that the DoC forced ICANN to make this decision, and are taking the whole business to court.

An 88-page document has been released by the US government, in accordance with the Act, revealing the internal and external communications within and without the DoC, and the resulting flurry of panic after pressure

Frustration
PETALS AROUND THE ROSE
There's little more satisfying than knowing the answer to something in front of someone who doesn't. And there are few times it's more satisfying when the answer is something *incredibly simple*.

Petals Around the Rose is a puzzle game that's been around since the 70s. The puzzle, involving the throw of five dice and announcing how many petals there are around the rose, came to some infamy after the story of Bill Gates' failure to solve it in June 1977 was belatedly spread across the internet. People can either solve it immediately, or agonise over the answer for days on end.

Chris Davis' site contains a simple Flash version of the game, that will check answers as you struggle. And we know the answer. It's *easy*.
crux.baker.edu/cdavis09/roses.html

Roboroar!
ROBOSAURUS
If we've ever made a similar claim before, we were wrong. And we're OK with that. *This* is the Best Thing Ever.

A 40ft tall, 60,000lb robot dinosaur that eats cars. Oh God yes. Oh, we didn't mention that it breathes 20ft flames. Twice as tall and over three times heavier than the Tyrannosaurus Rex upon which its based, this is Earth's Greatest Robot, capable of picking up cars and crushing them to bits with its vast teeth. *This* is why we bothered with evolution. So we could reach this pinnacle.

There's no greater man alive than he who sits in the cockpit, in the creature's head, controlling it as it tours the US demolishing things. Check out the site to see videos, stare at photos, and drop to your knees in worship. Robosaurus – we love you.
www.robosaurus.com

Gary's Cartoon
CONCERNED
Concerned: The Half-Life and Death of Gordon Frohman is this: a really good idea. It's a thrice-weekly updated web comic, created using *Gary's Mod* and the *Half-Life 2* engine. It's an absolutely inspired method for creating a comic, with the fully poseable characters, and pre-rendered backgrounds. And of course, no matter how clever it is, it would still be pointless without an excellent writer. Which it has. So that's good.

Christopher C Livingston's comic sees Gordon Frohman arrive in City 17, excited to start his holidays, unaware of the events made famous by *Half-Life 2* happening all around him. Immediately the peculiar familiarity of his name starts causing problems, although it's only recently that the real Freeman has appeared. This a compulsive bookmark and no mistake.
www.hlcomic.com

groups got wind of its intention to approve the proposal.

Right-wing campaign organisation, the Family Research Council, first contacted the DoC, followed by Mississippi Republican Representative Charles Pickering, who was concerned that it was siding with the notion of an obligatory .xxx suffix for porn sites. Two weeks later, four anti-porn groups and members of Pickering's staff met the DoC, petitioning it to refuse approval for ICANN to follow the application. And then right wing radio host Jim Dobson got involved.

X DIRECTORY

Executive Secretary Fred Schwien contacted others in his department. "What [Dobson] says on his radio program will determine how ugly this really gets – if he jumps on the bandwagon, our mail server may crash. Someone from the White House ought to call him and explain that the White House doesn't support the porn industry in any way."

Throughout June 2005 the documents are believed to show attempts by the DoC to cover up its role in controlling ICANN, going as far as to force news agencies to remove references to the department when covering the story.

And shockingly enough, the White House's favourite scandal-magnet Karl

Rove seems to have been the straw to break the Department of Commerce's back. After his meeting with Dobson, the DoC suddenly issued a "stop .xxx" order, stripping ICANN of any independent power, and effectively killed off the new suffix.

With this evidence, and in light of the recent second rejection, ICM is taking ICANN to court to demonstrate the pressure from the DoC, and challenge the legal legitimacy of the original decision. **PCF**

"The DoC has stripped ICANN of independent power, killed off the suffix"

Happy Friday

Blogger 'C Biscuit' has been taking a photo of herself driving to work every day for a year, in an exploration of monotony. Is she mad? You decide.

www.willdaddy.net/ blog/?page_id=76

Robot rock
PRESS PLAY ON TAPE
Denmark is great for two reasons. First LEGO, and more recently, *Press Play On Tape*. Describing themselves as a Commodore 64 Revival Band, the group perform classic videogame tunes live.

They recently found their status threatened when performing at the Copenhagen Retro Concert. So they upped the ante. They performed the *Cannon Fodder* theme using a *Guitar Hero* controller for guitar, a PS2 analogue for bass, an Xbox controller for digital vocals, *Donkey Konga* congas for... piano, the PS1 'scratch' controller for synth, a dancemat for drums, and *Sensi Soccer* and *CF* creator Jon Hare playing gunshots on the Arcade joystick. Geek war has never been so much fun.

Check out the band's website for video, tour info and CDs.
www.pressplayontape.com

Off-roading
TANK CHAIR
OK, so nothing can beat Robosaurus – but that doesn't mean we don't have a lot of respect for Tank Chair

Capable of traversing mud, snow, sand, gravel and streams, this heavily modified wheelchair is designed for off-roading. After a fire, the inventor's wife lost the use of her legs, putting her in a wheelchair. A few years later, when holidaying in a log cabin, the family excitedly followed a herd of elk into the woods, only to get the wheelchair stuck in the mud. This was the inspiration to create the awesome-looking Tank Chair, capable of elk chasing and wheelchair access to almost anywhere.
For every ten sold, the family give one away to someone who can't afford to buy their own. It's a pretty fantastic project – check out the videos on the site.
www.tankchair.com
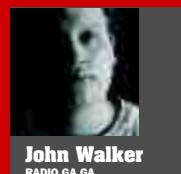
John Walker
RADIO GA GA

Copyright watch

There's a chance to win a fight. John Walker asks that you stand up for independent web radio

Fully ndependent internet radio began in 1997, with a radio station called 3WK Underground Radio. It's still broadcasting today, playing the latest in indie rock music, discovering new bands, and not playing chart-based crap. The station has always been legitimate, above board and a means for both larger and smaller bands to reach a worldwide audience. They're extremely passionate. And they're very lucky to be alive.

The RIAA has been attempting to destroy internet radio since its inception. And why? Because it's difficult to regulate. And by regulate, we mean rip off. A couple of years back they forced through legislation that meant internet radio stations were made to change from paying a fee for the rights to broadcast a particular song, to having to pay *every time* they broadcast that particular song. These inhibitive costs caused the vast majority of the independent stations to close down. A few, including 3WK, survived, and none

more deservingly as Wanda and co were at the forefront of the fight to prevent it happening. The RIAA bought their way past such obstacles, and the new rules were brought in.

But suddenly that's not enough, and the RIAA have once more fired up the 'Copyright Royalty Board' (a board of three judges who ask the RIAA what to think, and then think it), demanding that net radio stations pay 30% of their revenue to it. These new inhibitive copyright fees are ludicrous beyond words, and will finish off any remaining stations. Once again, the wonderful 3WK is standing up to the vile bullying thieves.

The RIAA is refusing to negotiate with 3WK, so 3WK is going to communicate through the courts. But it needs your help. Head to **www.3wk.com** and donate as much as you can to the legal fund, so that for once, the little guy can stand up to the RIAA, and maybe save independent internet radio.

Free internet radio is a good thing, and we should fight to protect it.

Picture Chris Garbutt

Save time!
Save money!
Subscribe!

PCFMail

DISCUSS HOT TOPICS AT forum.pcformat.co.uk

City is slicker

Regarding Andy Cole's letter about courier charges (*PCF189*). If he lives 30 minutes away from a major city, then the delivery van has to waste an hour travelling, in order to potentially deliver only one parcel to his village, taking the driver away from earning the company's bread and butter on a run of deliveries. How much does it cost to run a man with a van for an hour? Considerably more than the £11.75 surcharge, I shouldn't wonder. Who ends up paying if he's not in when they call and they have to come out again? Nobody is forcing him to live way out in the sticks.
RICHARD OLDROYD
richardoldroyd4@amserve.net

PCF says An interesting alternative view of the argument, admittedly although we'd still like to see online stores offering flat rate Royal Mail deliveries for customers in rural areas.

Mail of the month

In issue 188, you state "... the Mac is a viable gaming platform. This poses a dilemma for *PCF* – if people are buying Macs and installing Windows, should we be running more Apple coverage?"

In my opinion, the answer is simple – the Mac may become a viable gaming platform, and people may be installing Windows on the Mac, but your magazine is not *GamingFormat*, or *MacFormat*, or even *WindowsFormat*. Hard though it is to see around Uncle Bill's virtual monopoly, there is more to the PC than Windows. Your magazine is called *PCFormat* – please try to keep this in focus.

I find it interesting that Windows can be installed on the Mac, but as a PC user, this is merely a curiosity. If you have to diversify from the PC/Windows pairing, then go for the other PC-based options. Will OSX run on a PC? That would be suitable material. Linux could certainly be expanded upon.

I am not a Linux evangelist but I personally use it from time, and occasionally have to do some programming at home under a UNIX environment. Note to Luis, who, in his typically acerbic manner stated in issue 184 that "there are only two kinds of people running Linux. The ones that like a challenge for its own sake and the ones that distrust anything produced by Microsoft" – I'm in a third group, as described above. Please feel free to pass my comment on to Luis.
KEITH MOORE
ksmoore2@yahoo.co.uk

PCF says It's time to stop Jeremy flagging up every new Mac release in Geared Up, then.

Mail in and win

We've teamed up with ace memory suppliers Crucial www.crucial.com/uk to give the author of our letter of the month a fantastic 512MB Gizmo! USB memory drive worth over £30. It works flawlessly with every version of Windows after Me.

You can air your views and write to the team at PCF Mail, PCFormat, 30 Monmouth Street, Bath, BA1 2BW, or via email at the address below. Or you can visit our forum at forum.pcformat.co.uk.

pcfmail@futurenet.co.uk

One of us

Whilst sorting out a load of those pesky CDs-that-aren't-in-their-cases that we all seem to end up with in a box, I came across a load of my old *PCFormat* cover CDs, dating back to early 1995. After I got over the combination of feeling old and wanting to be a teenager again, I began looking through them. I even had to dig out an old 486 to view most of them, as the 64-bit version of Windows XP steadfastly refuses to execute 16-bit Windows applications!

So then I became curious – is there anywhere that has a history of *PCFormat* magazine? Maybe even some of the old mag covers? It's just the sort of thing that sad, reminiscent guys like myself would read of a Sunday evening.
BEN NUNNEY
manager@ramair.co.uk

PCF says Well Ben, wait for issue 200 for the definitive history of PCF, but in the meantime, check out this month's cover feature for some real nostalgia.

It's not a SiN

A long-time *PCFormat* subscriber, and I thought Alec Meer's review of S*iN Episodes* was spot on, and just what [A rival magazine – Ed] should have said. Keep up the good work!
NICK
nick@nickwray.com

PCF says Thanks for the praise Nick. We pride ourselves on the accuracy of our review scores.

Undeletion advice

I have deleted several photos from my PC a couple of months ago and deleted them also from my Recycle Bin. Is there any way to retrieve deleted files? Please can you help?
MCTART
mctart@aol.com

PCF says Yes there is, but don't expect miracles. Try the demo version of O&O Disk Recovery at www.oo-software.com or PC Inspector Smart Recovery from this issue's coverdisc.

A timely request

I would like to upgrade my PC. The last time I upgraded my machine was nearly six years ago (a 1.3GHz AMD Athlon, which has been a reliable workhorse for the last six years, so I consider it good value).

I am really out of the loop with regards to CPUs. I know the Celeron is the bottom of the Intel line and I assume Xeon seems to be the best chip they produce.

From the few shop sites I have checked, the Pentium 4 seems to be good value based on price and gigahertz rating (I would like to upgrade to a 3GHz at least).

Any ideas on how to get through this minefield of which chip is the best to buy?
With friendly regards,
DAVID BAXENDALE
David_Baxendale@web.de

PCF says Xeons are for servers, so don't worry about them. Pentiums are for the chop – look at one of the funky new Core 2 Duo chips instead. And Celerons are… a waste of the Earth's natural resources, if you ask us. Fortunately we can really help you navigate this minefield David, check out our review feature on page 66.

Longing for Leah

This isn't really relevant at all but I saw the front cover of this month's *PCFormat* and recognised the woman. Is she called Leah, and was she in Channel 4's reality show, *Shipwrecked*, this year? The model on your cover looks exactly like her, and I remember her claiming she was a model when she was on the show.
GINGERMIGIT
gingermigit@hotmail.com

PCF says Well spotted. Embarrassingly, we didn't.

65
ways the PC changed the world

Alec Meer looks back at the greatest achievements of the mighty computer

THE FIVE WORST MOMENTS

5 **Voodoo 4/5**
Megalomania and stubborness killed off 3dfx, the father of 3D acceleration, far too early.

4 **Daikatana**
Over-hyped, late and tedious, this cost *Doom* co-maestro John Romero his reputation.

3 **Win ME**
Before you write-off Vista as a pointless update, don't forget the futile, buggy bloatware that followed Win 98.

2 **GeForce FX**
Even aside from the ludicrous dustblower 5800, this poor-performing range almost cost NVIDIA the 3D war for good.

1 **Doom**
Yes, it's great. But it altered PC gaming forever, elbowing future innovation aside in favour of mindless violence.

Somebody's looking good for their age, aren't they? The PC is the Cliff Richard of technology, only without the virginity (as typing the wrong phrase into Google instantly proves), the hilarious swearing at TV chefs, or the decline of youthful energy into middle-aged ballad singing. IDespite, like Sir Cliff, now being eligible for a bus pass, the PC is only just entering its prime, finding its way into almost every home and, crucially, reaching a stage where its core elements are relatively accessible and hugely satisfying to even the most luddite novice. Unlike the erstwhile Harry Web, however, this prime should last for many decades to come.

FROM TINY ACORNS
If you take the ABC or Z3 as the first 'proper' computer, the PC has had a history of 65 years. Another 65 is all but guaranteed – and we can't wait to see what they hold.

There are thousands of important technological breakthroughs that have made the PC into the powerful, micro-engineered array of incredibly sophisticated electronics it is today, but we're not going to cover most of these here. We're looking specifically at what made the PC into the ultra-toy that lurks in the corner of studies, bedrooms and lounges across the world, effortlessly juggling games, movies and the shapeless gigantism of the internet. This, essentially, is the PC's greatest hits – they may not all have been the first, or even the best, of their kind, but they made the PC into the machine it is today. There are some ommissions, some – this is more a nostalgic stroll down memory lane than an historic analysis. Something unusual that may be of incredible importance to you simply might not have registered too strongly in *PCF*'s collective conciousness. Let us know if you disagree with this list.

> "The PC is truly the Cliff Richard of tech, only without the virginity"

Top 50 home computing moments
IN (ALMOST) NO PARTICULAR ORDER

50-47
CPUS
THE CHIPS THAT CHANGED OUR WORLD

1978 8086
All modern PC CPUs are essentially evolutions of Intel's x86 architecture, and backward compatibility with earlier generations has been key to its success.

1993 Pentium
As the PC took off as a gaming platform, Intel's fifth generation X86 chip had a 64-bit bus, multiple pipelines and, later, MMX technology. While MMX was massively underused, it introduced us to the idea that not all CPUs are equal, and more than megahertz matters.

1998 K6-2
AMD's response to the Pentium. It featured 3DNow!, making it as good as the P2 for all the important stuff – ie. games – but a hell of a lot cheaper.

2004 64-bit
OK, so we still haven't seen much in the way of 64-bit OSs or apps to go with it, but the Athlon 64 has been the definitive gamers' chip for the last couple of years. Raise a glass to it now.
2006

46
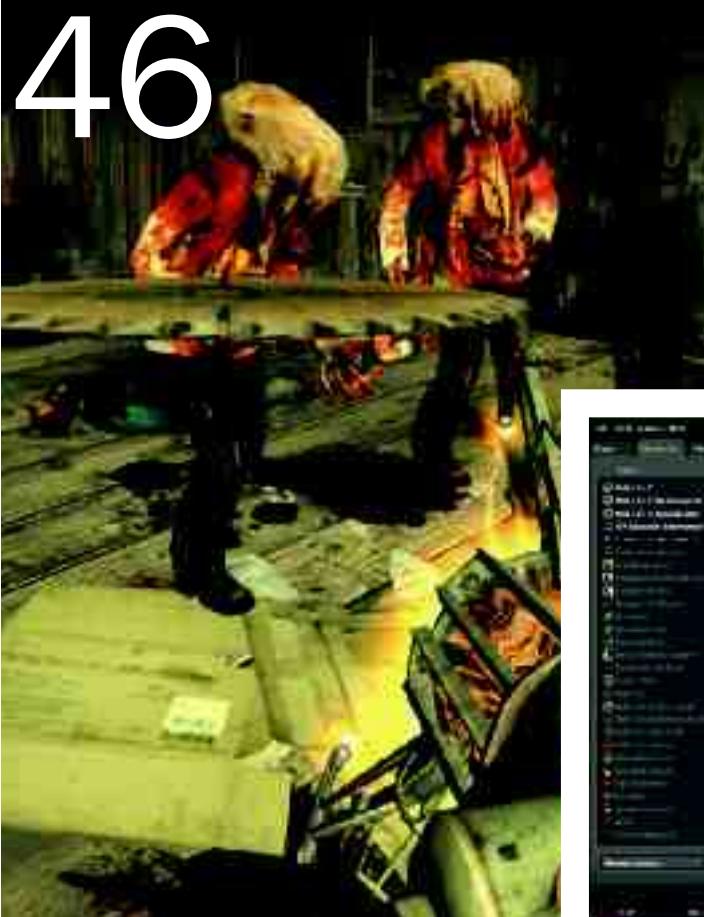
Steam
Half-Life developer Valve's proprietary distribution system may be a dial-up user's worst nightmare, but it's a major milestone. It frees developers and players from the tithes and restrictions of publishers, and means major exposure for the indie likes of *Darwinia* and *Ragdoll Kung-Fu*.

My favourite PC moment – Alec Meer, Deputy Editor
That first MP3, given to me on a floppy disk (Gosh! Imagine!) by a friend – Suspicious Minds by Elvis, it were. A grand day indeed – I can remember it like it were yesterday. Nothing new to the young 'uns, of course, but I can remember when all o' this were CDs…

45
SHUTTLE SMALL FORM FACTOR PC
The blessed breadbin PC wasn't invented by Shuttle, but it was that Tawainese motherboard manufacturer that gave the concept a smart, commercial makeover, with its 2001 SV24 barebones system. Fast-forward half a decade and Shuttle continues to pioneer small-sized but high performance desktop systems – there's even been an SLI shoebox, wouldja Adam'n'Eve it?

44
USB
Tech fascists (and Apple cultists) will hark on about the superior speeds and features of Firewire, but it doesn't have chance against the ubiquity of Universal Serial Bus. First birthed in 1995, and updated to USB 2.0 in 2000, it's helped transform the personal computer into an incredibly versatile technology hub.

43
FIREFOX
This upstart upsetter forms a bold rebel alliance with Google against Microsoft's evil empire. It's perhaps a bit weird to get excited about a web browser, but this slimline, customisable, open source number was the first major threat to *Internet Explorer* in a long time. First seen in 2002, latest guesstimates now have it at a 10% share of the browser market – no small beans against *IE*. **www.getfirefox.com**

42-41

Windows 3.1

Hang around any Slashdot thread long enough and an argument about who invented the GUI will start up. Microsoft didn't, in fact, but it was with 1992's Windows 3.1 that the concept really took off, signing the death warrant for DOS, Unix and the like in mainstream computing. »

« Windows XP

It's got more holes than a freshman's Encarta-researched dissertation, more crashes than a suburb full of becapped boy racers, more bugs than a... well, you get the picture. But the current Windows, released in 2001, is the one on which the PC grew to its most versatile form to date (think about its driver support, the ease of USB devices and the lack of DLL agony), so we have a real soft spot for the old OS.

40

WIFI

Combine wireless networking with a laptop and a streaming media device like the splendid Slingbox (see p49), and you can sit in the garden watching live grint on Five without a single cable even in sight. The rise of WiFi happened so quietly and gradually that it's nigh-on impossible to pin a date on when it really made it (it was almost unusably tricky to set up and flaky upon release). However, Intel's 2003 Centrino marketing campaign did the most to make the world sit up and take notice.

2D games THE BEST OF PC GAMING'S EARLY YEARS

38

THE SECRET OF MONKEY ISLAND

Whither the adventure game? Despite best attempts at a transplant, there really hasn't been anything to get it off its last legs in a long time. What's to blame? Is it that gamers en masse have become stupider, refusing to vote with their wallets unless there's guns, cars, or football? Or is it that the eminently quotable brand of sharp and surreal humour made popular by the first *Monkey Island* game (1990), and polished to an expert sheen over the likes of *Sam and Max*, *Day of the Tentacle* and *Grim Fandango*, has simply gone to seed of late? Please insert disk #23.

39

CIVILIZATION

If we had to name just one thing that earned the PC its reputation as the thinking man's gaming platform, it would be *Civilization*. The turn-based strategy series is now fifteen years old, but the recent *Civilization IV* proved it's still as fresh as Scarlett Johansen's lips. Really, there are few gaming moments as memorable as the first time you finished building your space rocket. That such a static, 2D, turn-based game with such a ponderous pace could evoke such a sense of immersion and obsession is enough to earn Sid Meier his place in silicon heaven.

37

Dune 2

How on Earth did this happen? What crazy man thought that Frank Herbert's series of agonisingly ponderous sci-fi novels would make a high-speed, all-action real-time strategy game? Whoever they were, they were right, and though this wasn't the first of its kind, it's what made the RTS into the form we know and love/hate it for today. Without this, there'd be no *C&C*, no *Dawn of War*, no *Warcraft...*

USB FLASH DRIVES

At last – a gizmo to take your files wherever you went, but, unlike floppy disks, one that didn't disintegrate if you so much as waggled your eyebrows at it. *PCF* awarded the first one we saw 78% in 2001. Oops.

36

35
Flight simulators
The noble plane 'em-up has fallen into a state of disrepair of late. Though it has a huge and incredibly passionate fanbase, there have been few recent offerings that captured the imagination of thousands in the way those of the early 90s did. *Flight Simulator*, *Falcon*, *F-15 Strike Eagle*, *Stunt Island*... their name is legion, and they helped the PC to evolve into the creature it is today.

34
Flat panel monitors
They might feel like they've been around forever, but oh-so-sexy TFT LCD panels didn't appear in a *PCF* Supertest until 2003. We'd been reviewing panels on their own for several years previously, but it was only then that they'd reached the point were they were a genuine performance rival to CRTs. Imaging professionals still swear by the old tubes, but in this widescreen age, there's now no going back for gamers and hi-def afficionados.

33
MSN MESSENGER
It is indeed good to talk, and for that reason instant messaging is quite a thorn in the side of the mobile phone industry. Why call up all your drinking chums individually and expensively when you could just start a free group chat over *Messenger*? It's an essential engine behind social lives and businesses alike.

Microsoft's 1999 offering, now eight versions and a few spin-offs down the line (eg. the business-orientated *Windows Messenger,* and the browser-based *Web Messenger*) wasn't the first instant messaging app. That honour belongs to 1996's *ICQ*, now owned by AOL, whose *AIM* app also happens to be *Messenger's* greatest rival. *AIM* is huge in the US, but hasn't made much of a dent over here – the UK remains very much Microsoft's stomping ground. And it continues to grow and improve with each incarnation.

32
Magnetic speaker shielding
No, this isn't the token joke entry (give that honour to *Windows XP* if anything) – try imagining a world where folk couldn't put speakers next to their monitors. Were that the case, the advent of MP3 and surround sound gaming may never have happened. In fact, the PC might have remained an uninteresting work machine. Plus, the thrill of carefully lining your old stereo boxes with magnet-blocking tinfoil is some of the earliest PC modding on record.

30
OPTICAL MOUSE
Forget the superior performance (budget models excluded) – the best thing about LED-based mice is you don't have to spend half an hour a month picking grime off the contacts. Though optical mice had been developed since the 1980s, it was with 1999's Microsoft Intellimouse Optical that the unblinking red eye began its world takeover. With the recent rise of laser mice (pictured), it's got much better for gamers.

31
BROADBAND
Ah, the fat pipe, best of all the pipes. The internet could have continued to be a vastly entertaining time-sink even if we had never progressed beyond dial-up. But in the last couple of years 512K and beyond speeds have really begun to earn their keep. We've now officially entered the age of on-demand digital video and audio, and there's no looking back. How does it work? Simple – just increase the frequency range of telephone line signals. Most of the UK is sorted now, but at the turn of the century, we were apoplectic about BT's refusal to open up its exchanges for nationwide ADSL availability.

Apple Powerbook

Cease making the sign of the cross for just a moment – the first Powerbook, released in 1991, was integral to making the laptop into the form we know today. The trackpad, the keyboard layout, palm rests, attractive design – these were Apple's innovations. There had been many portable computers previously, starting with 1981's Osborne 1, and consolidated by the Grid Compass the following year, but none made the concept as appealing as the Powerbook 100 Series. In 1992, IBM released the remarkably similar Thinkpad 700C, and the fate of PC laptops was set.

29

28
Zip files
Phil Katz's ZIP Program (PKZIP) may not have seemed like a big deal in 1989, but a decade and a half later, the word 'zip' is to archived files what Hoover is to vacuum cleaners. Corel bought out *Winzip* earlier this year, incidentally.

My favourite PC moment – Al Bickham, Technical Editor
75MHz? The plants in my garden oscillate at a higher frequency. But in 1993, me and a mate played *Mechwarrior 2* in glorious 3D until six in the morning, night after night. And all it took was Intel's breakthrough 75MHz Pentium CPU to do the job. It was... magical.

27-26

CD-R
It's not about backups, it's about sharing. Passing on a beloved album or movie to a friend, on a portable plastic disc that costs pennies, is simply a fine way to live.

DVD
If the death of the cursed videotape isn't enough for you, consider how helpful DVD has been for games (the end of disc-swapping!) and large-scale backups.

25

DIGITAL PHOTOGRAPHY
Believe it or not, the first ever digital camera to sport an LCD screen came and went back in *PCFormat* 63 (December 1996) with no fanfare, and a stern 43% kicking. In fairness, the Casio QV-10 could only muster 320x240 images and, unbelievably, didn't have a flash, despite costing £469. Oh, how we've grown. Dixons no longer even stock olde worlde film cameras, and *PCFormat's* editor loves his Nikon D70 digital SLR more than life itself.

TV on PC — **1991**
The media centre revolution begins. NEC demonstrates a laptop with a built-in TV tuner. A year later, Lifeview releases the first PCI TV card. A few years later, TV-out sockets would also aid the cause.

Voodoo — **1996**
Post-PlayStation, PC games were starting to look a bit ropey. Sure, we had *Magic Carpet*, but they had *Ridge Racer*, dammit. Fortunately 3dfx came along. The granddaddy of 3D cards died in 2000, but its contribution cannot be forgotten.

AGP — **1997**
PCI's 133MB/s didn't cut it for 3D cards any more, so the Advanced Graphics Port was born, debuting at 266MB/s.

T&L — **1999**
S3's Savage 2000 had hardware T&L, but the company never got round to writing drivers to enable it! A year later, NVIDIA did, for the GeForce 256.

GeForce3 — **2001**
One of the few PC technologies that can be called a 'must have'. Say hello to the first fully programmable pixel and vertex shader units. New cards are measured more by their shader pipes than speed.

2006

17
Ultima
The repeatedly groundbreaking RPG series wins an entry of its own because the roleplaying game has never been better than on PC, and almost all the genres best assets began in *Ultima*.

16
OPENOFFICE
The little open source app that could. For most of its life, it was championed but forever inferior to *Microsoft Office*, but it's with the recent version 2.0 that it became a strong, and still 100% free, competitor.

15
DIVX
No matter how hard it tries to wear a legit face, there's no denying the part the super compact DIVX codec had to play in video filesharing. And as illegal as that may be, it's now integral to the web.

14
PHOTOSHOP
We can count the number of people we know running legal copies of Adobe's flagship app on the fingers of one hand, but its contributions to PC-dom, from pro photo editing to the oddball joys of b3ta, is undeniable.

18
MP3
The world's premiere digital audio format is now 15 years old. Germany's Fraunhofer Society can't have known what it was about to unleash in 1991– Napster, iPod, lawsuits galore.

12

13
Creative Soundblaster
From those first strains of digitised speech and MIDI music in 1989, 16 bits in '92, 5.1 and EAX in '98, and through to the 24 bits, 7.1 sound and EAX 5 of the mighty X-Fi, the Soundblaster has kept our ears ecstatic.

My favourite PC moment – James Carey, Games Editor
I think voice comms have, more than anything, made gaming a richer experience. Thanks to Xbox Live and PS2 voice is synonymous with multiplayer, but pioneering indie stuff like Roger Wilco and Teamspeak let communities come together and express themselves.

3D games
WHEN GAMING EVOLVED, IT DID SO ON THE PC

11
WOLFENSTEIN 3D
It's not 3D-accelerated, but convince us its dynamic isn't essentially the same as that in *Doom*, *Unreal*, *Counter-Strike*, *Half-Life*, whatever you care to name, and we'll send you a prize (which may or may not consist of burning excrement). id software's second first-person shooter (its first was *Hovertank 3D*) was made in just two months, and upon its release in 1992 essentially established both the FPS genre and the (sadly short-lived) shareware model.

10
Half-Life
Ten years ago, a crack development unit left a software company they couldn't commit to. These men promptly escaped to Washington and began working on the world's best FPS. Today, still wanted by every publisher, they survive as developers of fortune. If you have a game, if no one else will publish it, and if you can find them, maybe you can hire...
The V-Team.

9
SYSTEM SHOCK
The BBC2 to *Wolfenstein*'s ITV, *System Shock* saved us all from a fate worse than *Doom 3*. Suddenly, a first-person perspective, monsters and guns didn't have to mean mindless violence anymore, and the PC's reputation as being home to gamers with a little going on in their heads was cemented. While it may not have aged quite as well as the others in this list, you only need to look at *Half-Life*, *Deus Ex*, the upcoming *Bioshock* and even *Oblivion* to see how influential Looking Glass' 1994 horror-shooter-RPG was on the PC's all-time greatest games.

8
Everquest
In its most halcyon of days, *Evercrack* only managed around half a million subscribers – a mere elven trifle compared to the money fountain *World of Warcraft*'s creators swim in nightly. But if there was one game that established the MMORPG as a thing of grinding, item obsession, comedy emotes and fiercely dedicated guilds, it was Sony's 1999 foray. *Ultima Online* was the better game, but *EQ* begat *WoW*, and so on.

7-3 http://www.

Five definitive web sites

The sites we think are the internet's most important achievements so far (porn and filesharing excluded). Without these, the web just wouldn't be the web...

THE WORLD WIDE WEB

Phones, consoles, televisions, even fridges – other technologies have tried, and resolutely failed, to wrest the internet from the PC's loving grasp. It's still very odd to consider that what's now seen as the world's foremost free speech tool originally began as a US defence project, 1969's Advanced Research Projects Agency Network (ARPANET), evolving into a TCP/IP wide-area network for universities in 1983. In 1991, the World Wide Web was so dubbed, and the rest is rapidly-changing history...

BBC NEWS
news.bbc.co.uk
Who'd have thought dear old Auntie would turn out to be such a pioneer? Audio streaming, video multicasts, RSS... the Beeb does it all.

THE ONION
www.theonion.com
The satirical NYC newspaper went online in 1996, and swiftly set a standard for intelligent comedy online.

AMAZON
www.amazon.co.uk
It's heartening that the web's first major commercial success story was a bookshop. It now sells everything, mind.

EBAY
www.ebay.co.uk
It's the internet's ideal of freedom incarnate – you can find almost anything, or be your own business.

BLOGSPOT
www.blogspot.com
Got something to say, no matter how tedious/weird/controversial/ill-informed? Now you can say it to the world...

2 Wikipedia – the future of the web

'Web 2.0' is one of the more sickening examples of adspeak blighting the world at the moment, but its original intentions are noble – and Wikipedia its most well-realised example. The ever-updated encyclopaedia is the most complete repository of information on the internet, and every word of it was written by real people (companies do attempt to pen themselves in overly-favourable lights, but other users will swiftly edit it into neutrality). If Google is the king of information, the multi-lingual Wikipedia is its rather more honest queen.

Though it's existed since 1991, it's only in the last year that Wiki has become such a reliable one-stop shop for answers.

1 Google

The search engine that ate the internet, the most important PC achievement of all time? Well, yes. Just think about how accessible it's definitive web aesthetic made the vaguaries of the internet to the world at large.

"Oi! Format! What about USB-powered desk fans?"
Yep, we've had to leave out hundreds of innovations. But d'you reckon some omissions are more important than the inclusions? Let us know at pcfmail@futurenet.co.uk and forum.pcformat.co.uk.

GTR2's improved graphics engine makes stunning in-game visuals commonplace.

GTR2

Less 'mirror, signal, manoeuvre' and more 'accelerate, crash, hospital', Mike Channell straps himself in, puts his foot down and tries to keep the greatest GT cars ever constructed by man out of the hedgerows…

This game's predecessor, GTR, *PCF172*, 82%) was a petrolhead's dream. A lovingly crafted take on the high-speed world of thoroughbred GT racers, it was pedantic in the extreme. Reminiscent of the genre's cult hero *Grand Prix Legends*, but with added allure of achingly desirable modern machinery, the simulation was warmly received by a community of racing fanatics keen to test their mettle in a game that brought them close to the challenge faced by real race drivers. It seems the world is chock full of wannabe Ayrton Sennas, all of them baying for the most realistic experience possible.

For those who cut their teeth on *Need for Speed*, though, *GTR* was not without its frustrations – the relentless realism meant those who didn't know the difference between slip angle and body roll couldn't finish a lap, let alone an entire race. What's more, the game was based on the recycled engine from 2003's

The AI now takes a lap or two to get warmed up, just like the brakes and tyres. Best prepare for some serious first-corner carnage, then.

As the track dries, the reflections disappear allowing you to stick to the faster areas and avoid the flooded ones. You will still crash that Lambo, however.

F1 Challenge 99-02, meaning a paucity of circuit furniture and shader effects negated the meticulously modelled cars.

UNFINISHED BUSINESS

Luckily *GTR* enjoyed a fair degree of commercial success, and after a brief excursion into the world of

bonnet though: *GTR2* has an entirely different philosophy from the first game. "We wanted to create a broader appeal," explained Diego Sartori, Game Designer at Simbin, "This was achieved by reworking the physics and in particular giving the tyre model a lot of attention. We believe we're

> ## "There's no contradiction between realism, a high level of simulated detail and playability"

TOMAS KARLSSON Chief Operations Officer, Simbin

historic touring and GT cars with *GT Legends*, Simbin is heading back to its old flame, the FIA GT championship, to settle all the criticisms levelled at the original. *GTR2* is powered by the DX9 Gmotor2 engine (the maths behind *GTL* and *rFactor*), which not only allows for a boffin baffling array of physics, but also graphics that are as tasty as the contents of its garage. There's more to the game than just a few tweaks under the

offering a game that supports all levels of play, including the opportunity to learn. For us realism does not mean hard, for us realism equals an intuitive drive that all can enjoy and some master." Tomas Karlsson, Chief Operations Officer, agrees. "There's no contradiction between realism, high level of detail and playability, it's all down to the presentation. We're putting a lot of focus in this area to make the game appeal to both hardcore

A RACECAR NAMED DESIRE
We take look at some of the new cars you'll be getting your clammy paws on

GTR's selection of tarmac-shredders was pretty impressive, but we have to admit to being stunned by some of the cars on offer in its sequel. We're particular fans of the mysterious 200mph-plus yellow peril that is the Saleen, and the less said about PCFormat's first meeting with the 2004-spec Lambourghini Murchielago, the better. Being seasoned petrolheads, we're a pretty brave bunch, but we'll admit that opening the Lambo up down the back straight at Spa Francorchamps (in torrential rain, at night) turned us into shaking, nonsense-spouting wrecks.

MASERATI MC12
CLASS GT

>> If you can master it, this is bottled lightning, and will immolate everything else on the circuit. Get it wrong, though, and a short, sharp appointment with the Armco is the best you can hope for. Believe it or not, to qualify for the championship, Maserati had to sell road-going versions of this hydra to normal people. And by normal, we mean filthy rich ones with a wanton disregard for their fragile lives.

NISSAN 350Z
CLASS NGT

>> Rock-solid Japanese engineering should ensure that you don't find yourself in the middle of a fireball as you hare down the straight at Monza. Not the prettiest of cars, nor the fastest, but in the right hands it can worry the Ferrari 360s and Porsche 911s. Still, it's hardly the most covetable car here. Maybe that's why we love shoving them into the gravel traps so much.

TVR T400R
CLASS NGT

>> When this mobile atom smasher is at rest, the burbling straight six is like having warm caramel poured into your ears. Put your foot down, though, and the world ends in a howling symphony of straining cylinders. Unfortunately thanks to the fact that the power plant sits right in the middle of that bonnet, this is a car that needs to be forcibly persuaded around corners.

BMW M3-GTR
CLASS G2

>> No, the race hasn't been invaded by a rogue bank manager from Swindon: BMW has a racing car, and it's remarkably fun to drive. Balance and poise are the name of the game, and in the twisty stuff the M3-GTR is a formidable weapon. Despite the throbbing V8 at its heart, the Beemer is a relatively forgiving beast, and as a result should see plenty of action from GTR newbies.

CHRYSLER VIPER
COMP COUPE G3

>> This lovable hunk of American pig iron has as much grunt as a nuclear power station and squares up to the flouncy Porsche 996 with typical US of A bravado. Massive understeer is the biggest chink in its armour, though; at times turning the QE2 around would be less of a chore. But while it's not as pointy as a Porker, its hefty 8.3 litre V10 means it's none too shabby in a straight line.

Crumple zone
Keeping the ancient and noble art of panel beating alive…

While we'll be trying our very best to keep these gleaming machines on the black stuff, there are always going to be occasions where things go fundamentally and horribly awry. Luckily developer Simbin has revamped the damage model since GTR and there are now millions of different ways to roll your car up into a paper ball. Not only that, but wayward bumpers and wheels will go on to damage other cars if crashed into. Here are just three examples of the damage you can do to these lovingly crafted, and monstrously expensive, racing machines.

»AIRBORNE

»UNDRESSED

»AFLAME

racing sim players and casual gamers alike."

One of the ways Simbin is hoping to tackle the steep learning curve inherent in taming a 650bhp road-bound rocket is with an all-new Driving School mode, which should teach even the greenest Sunday drivers the nuances of wheel-to-wheel racing. "There will be over 60 lessons, taking the player from basic driving up to more advanced techniques like race craft," Sartori revealed to us, and with the aid of ghost instructor cars, clearly visible racing lines and unlockable rewards for completed challenges, there's even an incentive for seasoned drivers to refine their skills.

HANDLING CHARGE
Another way Simbin plans to dispel newbie fears is through further refinement of the in-game physics, particularly the aforementioned tyres. "One aspect where have

learned a lot since GTR is the tyre model," Sartori admitted. "We had some issues that we wanted to improve on and the physics team have done a fantastic job." Henrik Roos, Simbin CEO and GT racing driver agreed, "We have made huge improvements on the slip angle of the cars in low-speed corners. The

"The game simulates everything on the car and its surroundings in minute detail"

JOHAN ROOS Chief Marketing Officer, Simbin

physics also now allow cars to drift at high and low speeds with much better control, which also is more realistic." This essentially means that all those occasions in GTR where the car did its best impression of a washing machine should have evaporated like so much

tyre smoke. The cars are still demanding to drive, but they are far more predictable in their responses, leaving you to concentrate on hitting those apexes and avoiding getting intimate with the guy in front's exhaust pipe.

Of course, the truly hardcore racers out there need to be satisfied as well, which is why Simbin is pushing towards new levels of detail in racing simulation. Practically nothing is left unaccounted for, and there are some amazing lengths the team will go to in order to accurately represent a working race car. PCF couldn't help but ask what the most

minute detail that Simbin saw fit to render was, and Johan Roos, the team's Chief Marketing Officer, was happy to respond. "Fuel movement in the cars' fuel cells affecting the weight distribution of each vehicle is definitely such a detail, but since we simulate everything on the car and its surroundings it is hard to mention just that one thing." That's right – they're actually simulating petrol sloshing in the tank.

ATTENTION TO DETAIL
New for GTR2 is truly dynamic brake disk glow, and unlike most games it is more than just a visual flourish. "A thing that few will notice might be the fact that disc glow is 100% based on the actual temperature of the disc, this means that if the player makes changes to the cooling or the brake bias, those changes will affect how much each disc will glow," enthused Roos. This is a game that caters for those who

GTR2's starts are, without exception, fraught affairs.

Night races are visually stunning and demanding. Crashing often looks more spectacular in the dark, but whatever you do, don't smash those headlights.

Parallel parking: easy.

enjoy constantly searching for the perfect car setup.

The LiveTrack system, which debuted in *GTR* has also had an overhaul, and now offers a true visual representation of the state of the track. As a race progresses, rubber is visibly laid down on the racing line, increasing the grip. Stray wide onto the 'marbles', though, and you may find your steering as ineffectual as flapping a hankie at an oncoming tornado. In rainy conditions, LiveTrack becomes even more relevant. "New for LiveTrack is support for a drying race track both visually and physically. This adds a completely new dimension to wet weather racing where strategy and choices can actually make or break a race," Sartori informed us. "With the drying race line the player is faced with the choice of staying on wet or intermediate tyres, or changing to dry slick tyres. Once that choice is made, the player's racing or overtaking lines around a lap will differ from players on other types of tyres."

Finally, with the shift to gMotor2, the jarring day and night transitions from *GTR* are banished altogether by a continuous lighting cycle, allowing for 24 hour races in all weather conditions. As the sun drops in the sky and the shadows lengthen, there's the added danger of glare obscuring your vision, and racing through the night presents its own, fairly obvious, challenges. Best of all, if you want all the thrills of 24 hour racing with none of the deep vein thrombosis, you can reduce the whole race to as little as 24 minutes. That's weird, though.

The cockpits are beautiful, making *GTR2* and TrackIR perfect bedfellows.

WHEELS OF STEEL
Of course all this means nothing if the game doesn't feel right. In order to ensure *GTR2* offers the most realistic racing possible, Simbin got together with drivers from the FIA GT Championship to garner their opinions. "The majority of the FIA GT drivers have driven *GTR* and they do really love it, and when we get feedback and suggestions from them we address it internally and tweak our models accordingly," explains Roos. "There have been occasions where drivers have been late for sessions on the racetrack due to racing *GTR* in our simulators, even late for race

sessions. I wont mention any names, though…"

GTR2 is shaping up to be a stunning addition to Simbin's racing stable. With the inclusion of all the content from the original, plus unlockable bonus tracks, there should be plenty to sink your teeth into. Not only that, but those who were alienated by the original's obsessive level of detail should find the refined physics model easier to digest and the driving school much more welcoming. For the hardcore, suffice to say that Simbin has raised the bar for driving simulation once again, making this the closest you can get to racing without half-inching Schumacher's keys. **PCF**

Below is an exclusive wireframe render from Simbin's next title, based on the World Touring Car Championship, and currently in the early stages of project development.

The team hopes to once again push the envelope in racing simulation. The major difference between touring cars and GT racing, aside from sheer power, is that many of the contenders in the WTCC, like this Seat Leon, are front-wheel drive. Diego Sartori (pictured above) was on hand to explain why this game will present a challenge unique from the one faced in *GTR2*. "WTCC will require a different driving technique because the cars are more evenly matched and have less horsepower."

Carrying momentum through the corners becomes crucial when the drive is delivered through the same wheels as the steering, and when you start to lose the back end, keeping the power on will ensure you don't become a greasy stain on the safety barrier. "Driving a front wheel drive race car is very different from a rear wheel drive car," Sartori told us. "With the front wheel drive car there is far greater strain on the front tyres as they are doing all the work, accelerating, braking and steering. The driver must tend to his tyres in a different way from a rear wheel drive vehicle, adding strategy to the game depending on the car he chooses to race in."
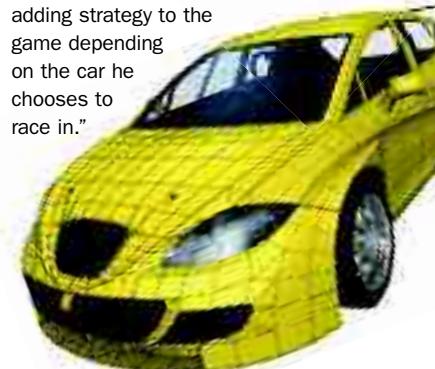
The colours on the road show what the game has determined to be the 'perfect' racing line. Ours is more… unorthodox.

Just who will be powering the living room PCs of the future? Neil Mohr has the idiots' guide as to which sticker – Viiv or Live! – looks best from the viewing distance of your sofa

No-one would have believed in the first years of the 21st century that our PC habits were being watched keenly and closely by intelligences vastly inferior to our own. From the depths of vast mega corporations, cool and unsympathetic marketing strategists regarded our wallets with envious eyes, and slowly but surely drew their marketing campaigns against us.

We don't know exactly when it started or who started it but at some point, somewhere, someone thought it would be a good idea to put a PC in the living room. They've got a lot to answer for. Now all the big players have got bees in their corporate bonnets about being able to sell us more PCs and more operating systems by fuelling the desire for Media Center PCs.

The clue to the approach Intel and AMD are taking is in right there in the name, the key is 'media', a PC on its own is of no use in the living room. Apple's lucky blunder with the iPod is a great example and a huge industry catalyst. The iPod went from being just a footnote in the company's financial reports in 2001 to being a key part of its core business strategy in 2003. It's now seen as a model for how a combination of computer and internet distribution could be a real moneyspinner.

WIN-WIN SITUATION
On the face of it, no-one loses. PC companies and all the vendors, suppliers and component manufacturers benefit, media companies sell more products with lower overheads, internet service providers get more customers, Microsoft

> "At some point, somewhere, someone thought it would be a good idea to put a PC in the living room"

is always happy when PCs are sold and customers feasibly get more convenient access to the latest and greatest products. So why is it all taking so long? Well as you might have read over the years within these very pages the media

companies don't seem to like computer users. A person might get the impression they appear to think we're all pirating scum. Not a pleasant thing to call your customers.

The success of iTunes and the ringing of many virtual cash registers has encouraged music publishers to open sales up to online providers and even the movie industry is now starting to edge towards online distribution. The times, they are slowly changing.

To ensure it gets as big a slice of the action as possible Intel has come up with Viiv. It's a

new architectural platform that works on three levels, and it comes with a lovely sticker. The easiest area to explain is the hardware, which is all Intel of course. To be classed in the Viiv club a system has to have: an Intel dual-core

processor such as Pentium-D or Core Duo, a compatible Intel based motherboard like the i965 or i975X chipset, a network port, 7.1 high-definition sound and Windows XP Media Center to keep Microsoft rolling in the readies.

The other side to Viiv is where those lovely marketing boys and girls get their noses firmly stuck in. By lining up a whole host of content providers offering streaming and download products we're meant to be wowed by the exciting new things we can suddenly do with these PCs. Wanting to throw our money at both the new systems and content that has suddenly become unlocked to us through Viiv channels.

EXPANSION OPTIONS
The second area that won't arrive until version 1.5, and possibly only version 2.0, are the internet and LAN-based services. These include

Intel Hub Connect Technology, Viiv Zone and Viiv Media Server, and they enable content to stream from your PC to a compatible Viiv device – like a TV – at the touch of a button. They will also power the verified services and applications and enable us to shift digital content around our homes to expensive and obvious places such as the Xbox 360. This will turn the PC into a real server once more, partly with streaming and partly with 'verified' boxes around the home that will be capable of taking advantage of Viiv services, whatever they may be.

Wherever Intel roams, AMD is never far behind and so we have Live! with its fun punctuation thrown in for extra exuberance. It's remarkably similar to the Viiv concept; there's a base hardware specification including a minimum of a dual-core Athlon 64 X2 4200+ and Vista capable hardware. There's also a number of

network-based services: but this is where AMD's vision diverges from Intel. At the heart of Viiv is its dependence on consumers needing the Viiv PC to access premium content, obviously DRM'd up to the hilt, and giving the consumer permission to then pipe that around their verified devices.

The Live! system will be equally able to handle this type of task but AMD is concentrating its marketing efforts on the user's own content and shifting it from the PC to where the user wants it, whether it's premium content or not. A lot of emphasis is being placed on re-encoding video so they can be handled by set-top boxes over an ethernet connection streaming the entire desktop via XML for remote access. How good this actually looks with a high-definition television we'd like to see, but it shows that AMD is trying to work with existing systems rather than supplanting them. **PCF**

AMD LIVE!

PROCESSOR	Athlon 64 X2 4200+ or dual-core Athlon 64 FX
MOTHERBOARD	Socket AM2
NETWORK	Gigabit ethernet
AUDIO	High-Def 5.1 Audio with SPDIF output
HARD DRIVE	SATA-II
MEMORY	1GB DDR2 667/800
PORTS	6 USB-2, Firewire
PSU	High-efficiency with low rotation fan
OS	Windows XP Media Center Edition.

Slingbox
It's nothing like a sling, or a box, but it's easy to use...

Before you get too carried away, remember AMD and Intel aren't the only guys in town. The Slingbox, for example, is one of the best gadgets we've ever had the pleasure of plugging into our routers. Simply connect it to a TV aerial anywhere in the world, and you can stream the signal to your PC.

It trumps the similar Sony Location-Free by including an integrated analogue and digital TV tuner, meaning you can pick up Neighbours at lunchtime from a laptop on a beach in Hawaii (so long as there's a

wireless signal nearby). Like the LocationFree, there are inputs for other video devices, though this sweetens the deal by including S-video as well as composite (VGA, RGB SCART or component remains sadly absent), plus pass-through outputs so you don't have to de-cable existing set-ups that don't have more than one output.

The stand-out feature, though, is the incredible ease of setup – no faffing with IP addresses or port forwarding (the Slingbox can automatically configure most UPnP routers), and the video stream is smartly

reconfigured for available bandwidth every time you access it. Obviously, you won't get broadcast quality video over a broadband upstream, but until the BBC et al get around to providing a complete IPTV package, this is as good as it gets. You can grab yourself one from www.dixons.co.uk for £180. More information and factoids can be fouund at www.slingmedia.com.

INTEL VIIV

PROCESSOR	Pentium D, Pentium Extreme Edition or Core Duo
MOTHERBOARD	975X, 955X, 945G/P/GT using ICH7-DH southbridge
NETWORK	Intel PRO/1000 PM or Intel Pro/100
AUDIO	Intel High-Def 7.1 Audio
HARD DRIVE	N/A
MEMORY	DDR2
PORTS	N/A
PSU	N/A
OS	Windows XP Media Center Edition

Spy vs Spy Who will win this dastardly war?

CORE ISSUES

A key part to both systems are the dual-core processors. While we could go on at length about the intricacies of both architectures, the fact is that both do a fine job at powering games and high-def content. The specifics of price and performance are discussed in detail over in our feature on p66. For now, though, we're just looking at feature specs, and there's not a lot in it.
Result: Draw

OPEN AND SHUT CASE

Viiv appears to be a close architecture that's totally Intel controlled and Viiv content will only be available to Viiv owning customers. AMD's tactic is a more open-ended model, as long as it's an AMD processor you're using, and its content emphasis is far more consumer friendly.
Result: AMD

NOT SO CONNECTED

Both camps lose for not enforcing wireless connectivity as it's really a key part of a digital home. Yet there's little or no move to make it standard on the desktop. Both do specify the necessity for an ethernet port but today that's almost like saying make sure it has an on switch. AMD wins as it at least has the RJ45s to make sure they're Gigabit.
Result: AMD

OH DO BE QUIET

PCs should be seen and not heard. AMD on one level seems to win this hands down, as it specifies DDR2 memory. This means Socket AM2, which is low power processors running Cool'n'Quiet technology and specifying low-noise PSU. However, despite being able to use Pentium D models, Intel specifies they must all be 65nm processors. This greatly helps reduce heat and noise, and Intel is lowering power envelopes for the Conroe line-up as well.
Result: Draw

I CONSUME THEREFORE I AM

We go back to the problem that if there's no PC based media, why would you ever want a Media Center PC? AMD's approach is to let consumers get hold of the content via whatever means, nefarious or not, the internet provides, then lets the PC serve the media to whatever or wherever it's needed. Intel is taking a more direct approach signing content providers to the Viiv way of life, a ready locked-in pool of ravenous consumers willing to part with their hard earned cash for stuff they could already buy more conveniently elsewhere. We're not convinced but...
Result: Intel

NETWORK SERVICES

This area is still tentative as the majority of Viiv's network services are yet to be released. AMD doesn't do much better but at least its compression, network configuration, remote access and streaming services are available to all from www.amdlive.com. Piping the PC interface and content to set-top boxes as re-encoded MPEG2 is also clever but we need devices and are concerned about end image-quality.
Result: AMD

We say...
AMD wins!

It's a close run thing as neither standard tries to innovate in any particularly exciting way. Viiv could potentially offer more interesting services due to the verified devices but, as it's a closed shop, it'll stand or fall by being able to offer compelling content. The AMD solution seems to make much more sense as it embraces the way people currently use their PCs and the devices that surround it.

It does seem as if we're in a transition period, moving from discrete, relatively dumb devices that do specific jobs, to intelligent devices that can multitask and accomplish a great deal. The likes of Intel and, to a lesser extent AMD, are betting on these devices being PC based. Whether that becomes the case is down to the wider public to decide.

Advanced set-top boxes, such as those supplied by Sky and the next generation of consoles, certainly offer a large portion of the functionality that a PC does. Combine these with a High-Def player and you have most of the main functions people would want.

The big advantage is that on the whole they look better, take up less space, are quieter, use less energy, are simpler to use and cost less. We're not saying Media Center PCs are bad, we love them, we use them but we don't expect our gran or even our parents to, and when you're trying to sell to the mainstream, that's your audience.

How about a nice game of... tic tac

Six tribes go to war in a game that breathes life into our Eighties nuclear nightmares. Kieron Gillen's got his finger on the button

Due September **Publisher** Introvsersion **Developer** Introvsersion **Web** www.introversion.co.uk

All hail Introversion, British game development's little engine that could. The self-proclaimed Last of the Bedroom Programmers has made two games which gained critical acclaim and dignified sales, with *Darwinia* recently getting a second life on Valve's *Steam*. It's recently swept the board at the Independent Games Festival, netting three awards, including the grand-prize, where the team drunkenly made a speech about not letting publishers mess with their game, to a standing ovation. They're the toast of the gaming chattering classes, and the only question is, what's next? Well, there's this little game called *Defcon*. It's about a sport *PCFormat* likes to call Global Thermonuclear War. We talk to prime Introversion creative force Chris Delay about its plans for the end of the world.
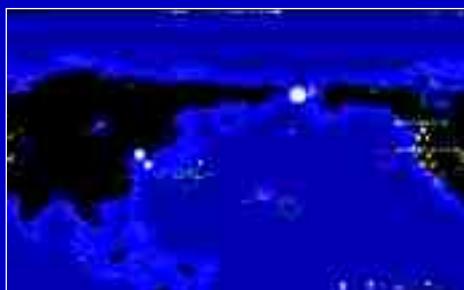
PCF You've been doing the superstar games programmer thing recently. You've presumably been explaining Defcon to people you've met. How do you describe the game?

CD It's really quite a refreshing experience for us: Defcon is easy to explain. For the past couple of years we've struggled with blank looks and uncomfortable silences while we explained *Darwinia* to various people, and I for one am glad that's over. I can explain *Defcon* in about 15 seconds, and if that's not enough I can just say "that bit in *Wargames*" and everyone gets it. Even better, a single screenshot and the words "multiplayer nuclear wargame" are enough to explain the whole game to most people.

PCF You've just delayed Defcon until September, extending the development time. How has this changed the game?

CD *Defcon*'s design has always been pretty sparse, and the core of the game has been pretty much fixed since day one. It's a polar opposite of *Darwinia*'s open-ended experimentation. We've spent pretty much all of our game design time fiddling with unit balances and changing the abilities of various units, but it's never strayed that far from the initial concept. *Defcon*'s strength is that it's rooted in the real world, so everyone

knows that a sub launches nukes and is invisible to radar, and everyone knows an airbase launches fighters and bombers. To some extent this rules out serious changes to the units – you can't arbitrarily decide battleships can now go through land – but it means the challenge is finding a gameplay balance based on real world abilities.

PCF So are there any major changes? Or is it just balancing?

CD One of the few significant changes to the original design was the expansion from a two-player game to on that will accommodate up to six players. *Defcon* was designed to be Nato (green) versus the Soviet Union (red, of course) – which of course you can still play if you want to. We eventually realised that from a gameplay point of view, there's absolutely no reason why all the world continents can't be used – and that we were stifling the gameplay possibilities by insisting

Fisher, Dogger, German Bite: cloudy becoming rain, fair, some fiery extermination of mankind, poor.

Office politics
Four-minute written warning

While the classic Defcon game is to be played in accelerated time, the fact that a "real" nuclear war would be over in less than a working day has lead to an inspired alternative: office mode. Here the game plays out in real-time, with work-mates starting it in the morning and it all coming to a climax within eight hours or so. A panic-button allows you to skip between the game something a little more work-related discretely, and a status-tray icon informing you of major events, like a nuke launching. Since it'll be 30 minutes at least until they land, you've got plenty of chances to respond without entirely ruining your work. One question remains: will there be fallout into the office atmosphere?

toe?

"The words 'multiplayer nuclear wargame are all people need to hear"

on such a rigid scenario. Once we opened the game up so players can play as Africa, South America and so on, we started to see much more varied games, and it opened up the whole possibility of the player alliances system.

PCF What was the main reason for Defcon's delay?

CD *Defcon* is Introversion's first multiplayer game. It's also the first time any of us have developed any commercial networking code and it's one of those areas of computer science that's very

> **"Any notion that Introversion is following a 10-year plan set out before Uplink is beyond lunacy"**
>
> CHRIS DALEY Introversion Software

difficult to get right. Everyone out there has a slightly different network configuration – some are behind firewalls, some have NAT routers, some are on college networks, and writing game code that can work over any of these networks is a nightmare. It's proving to be much more complex and difficult than we originally thought it would be. The really cool thing is that we now have this technology, and we can use it in our future games. Any Introversion game that involves multiplayer from now on will be considerably easier to finish.

PCF You've been clever and subtle with the game's more arcane content. There's a veiled reference to Defcon

buried in one of your previous games, Uplink, isn't there?

CD The things that inspire us have remained constant for a while, and a lot of those things are classic movies from the 1980s. *Defcon* obviously takes huge inspiration from the movie *Wargames*, but *Uplink* also references that movie a lot. *Uplink* takes its inspiration from the hacking elements of *Wargames* – the war-dialling, password breaking, school record changing and so on. *Defcon* takes its inspiration from the Cold War and the scenes in the NORAD bunker with the US Generals watching the world end in chuggy wireframe. *Darwinia* obviously gets most of its inspiration from *Tron*. So it wouldn't be right for us to claim there was a *Defcon* reference buried in *Uplink*. In reality there is a *Wargames* reference buried in *Uplink*, in which the player gets to nuke the major cities on a world map, and we later developed that inspiration into a full game.

PCF So no secret 10 year plan then?

CD Any notion that we are following a 10-year plan set out before *Uplink* is beyond lunacy. Who the hell would plan to spend three years developing a game hardly anyone understands when they see it? The only plan we've ever had is to try and make original games and stay out of work while we do it. **PCF**

A scene from NORAD, as represented in *Wargames*. It's like peering inside Jeremy Laird's brain.

Picture © Kobal

Mind games
Bedroom coders in excelsis

Introversion formed back in 2001, when Mark Morris, Thomas Arundel and Chris Delay got together to try and sell the hacking game Chris wrote during his spare time at university. With £600 of startup cash, they set to work burning their own CDs and sending them out. This was Uplink, their original success. Their second game was the critically acclaimed Darwinia, which blended a half dozen or so genres. "When we were doing the interviews and press for Darwinia we referred to it as a retro RTS," Chris remembers, "and in hindsight we think that was probably a mistake. We set up a lot of expectations that weren't met – people expecting an RTS found something quite different."

reviews

All the latest games, gear and apps

90

Half Life 2: Episode One

Our scoring system

0-19% Unusable or astoundingly rubbish
20-49% Largely not worth spending money on
50-69% Some decent features but uninspiring
70-79% Accomplished without the must-have factor
80-89% Outstanding. Awarded Top Gear or High Score
90+ Exceptional. A *PCFormat* Gold Award winner

Our key promises

1. PCF has the most thorough reviews
We've been reviewing kit and games for 14 years. With over 8,500 reviews written, we have the most talented, dedicated and authoritative teams in the business.

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We never trade pages for exclusives, or review games not signed off as finished by the publisher. Where we've looked at reference hardware, we'll make that clear in the review.

3. The PCFormat Gold Award
Only when a piece of equipment or game exceeds our expectations in terms of innovation, excellence and value for money does it get one of these coveted honours.

4. High Score/Top Gear
It's a misconception that only 90%+ is an essential purchase. Anything scoring 80% or higher is festooned with one of these, making it one of the month's most highly recommended.

5. We want to know what you think
We are PC fans writing for PC fans, so please share your thoughts on new stuff in our forum: **http://forum.pcformat.co.uk**

gold
PCFormat

high score
PCFormat

top gear
PCFormat

58

NVIDIA 7950GX2

PCFormat Experts

JEREMY LAIRD
Waxing lyrical about the power of Intel's Conroe is a hobby of Laird's, and his latest love letter to the new chipset starts on p66.

MOST WANTED
Need you ask?

NEIL MOHR
Has decided whether Viiv or Live! is best on p49. We are assured that the quality each brand's logo was not a factor.

MOST WANTED
HL2: Episode 1

RICH COBBETT
Richard's dalliance with *Civ City* (p101) has had a strange effect on him. He now can't abide bread at all.

MOST WANTED
A toga

DAVE JAMES
DJ's hard drives minitest (p70) is essential reading if you want to increase storage without decreasing readies.

MOST WANTED
An extra terabyte

ALEC MEER
Dep Ed Alec's '65 Things…' feature on pdd charts the rise of the PC, and the rise of rubbish first-person shooters, sadly.

MOST WANTED
Robots from eBay

MIKE CHANNELL
MightySeven's behind the scenes feature on *GTR2* was such a labour of love, we suspect he'd have written it for free.

MOST WANTED
A Maserati MC12

THIS MONTH

98 Sensible Soccer 2006

66 Everything AM2

70 Hard drives

78 Compact cameras

75 >> ACER AT3205-DTV Silver screen dreams
Not wishing to be pigeonholed as a PC-centric company, bless them, monitor maestro Acer occasionally tries its hand at affordable LCD tellies. Of course when it's an enormous 32-inch HD effort that can be carted away for just over 800 smackers, you can bet that *PCF* will sit up and take note (shortly before sitting down and watching high def movies).
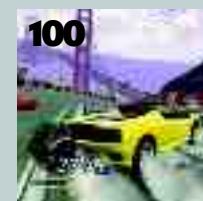
100 >> OUTRUN 2006 Stick it to speed cameras
Aside from 'Lead Foot' Laird, the *PCF* team are relatively meek drivers, but it took little more than the prospect of heartily chucking a Ferrari F40 around sweeping four lane highways to bring out the speed demon inside. *Outrun 2006* ditches the laws of physics for one simple rule – if you can still see where you're going, you just aren't sideways enough.
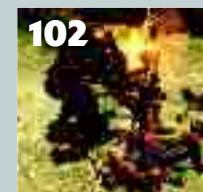
102 >> TITAN QUEST It's all Greek to us
We've been hankering for a successor to *Diablo II* for some time now, and *Titan Quest* is a definite contender to fill the low-res sprite shaped void in our lives. The story was penned by the chap who wrote *Braveheart*, so swap a woad covered Mel Gibson for a gigantic and wholeheartedly terrifying spider lady and you've got the vague idea.

PLUS

FOR MORE REVIEWS...
Check out the *PCF* blog, where we bring you the best-informed opinions of new releases even sooner these young internet upstarts we keep hearing about. Head over to **blog. pcformat.co.uk** for regular updates. On the blog this month, you'll find:
>> Prey >> Caesar IV >> Civilization: Warlords expansion >> FlatOut 2

TWIN TURBO

NVIDIA GeForce 7950 GX2

Two to-notch graphics processors. One power-hungry 3D card. Al Bickham straps on his biggest PSU for an electrifying experience…

Price £375 **Manufacturer** NVIDIA **Web** www.nvidia.com

Like making babies and starting wars, the quest for performance seems hardwired into the human genome. Whether it's valves in an engine, cores in a CPU or slots in your toaster, enterprising and power-hungry professionals throughout history have sought to increase output. It should come as no surprise, then, to learn that NVIDIA is now a good half-mile down the road towards proper dual-core GPUs. This, the Geforce 7950 GX2, is the physical successor to the 7900 GTX dual-GPU card, which was so fiddly and

Express slot, as it's basically a pair of 7900 (G71) cores, each with 512MB GDDR3 RAM to itself and its own discrete heat-sink, spooning up for some SLI love. No joke – take a look at the images here; it's basically two cards welded together and bridged at PCB level. GX2 is a beefy-looking sandwich of technology and, given the titanic heatsink on the 7900GTX, it's hard to believe the GX2's diminutive coolers are capable of keeping each GPU on the straight and narrow.

Interestingly, these aren't quite your standard G71 GPUs. Running at 500MHz, with the memory throttled

"The GX2 offers SLI-grade performance through a single PCI-Express slot, no joke"

problematic, it was never available as a discrete component, only as an option in pointless quad-SLI rigs from system-builders. The only other dual-GPU card available before this was Asus' N7800GT – a pair of G70 cores on a single card, with a price tag in excess of £600. Ouch.

The GX2 offers SLI-grade performance through a single PCI-

down to 1200MHz, the 7950 core shows a speed deficit in the face of the 7900GTX's 650/1600MHz settings. As a result, each card runs a notch slower than its GTX counterpart, while still fielding a solid spread of 24 pixel pipelines apiece. One of the upshots is reduced running temperature – hence the smaller heat sinks. Each half of the 7950 is pretty much identical to the Go 7900 core, NVIDIA's latest laptop card, which is lower-clocked than its desktop counterpart for reduced running costs in terms of power and temperature.

All of which, on paper at least, places it somewhere between 7900 GT and 7900 GTX SLI setups on the performance front. Also, this is the card that may make self-built Quad-SLI rigs a reality. However, as we'll show later through rigorous benchmarking, the most powerful single cards are limited by even a high-end CPU. Unless you're building a next-gen chip like Core 2 Duo into the equation, quad-SLI really isn't worth getting wet over.

Will the 7950 GX2 blow existing single card and SLI /CrossFire setups out of the marketplace? It's all down to the performance you get for your money – and that's what we're really here to find out.

HOW WE TESTED
Getting the best out of the best

Game performance is everything, so we've gone easy on the synthetic benchmarks, relying only on *3DMark06*. For frames-per-second gaming analyses, we used our own timed demos in *Half-Life 2: Episode One* and *Quake IV* (patched up with dual-core optimisation), as well as the native performance test in *F.E.A.R.*, and *Fraps*-captured FPS averages in *Oblivion's* performance-eating Great Forest area. As for settings, we ran the gamut: for standard single cards and the

7900GT test, we ran tests in ground-roots 1,280x1,024 with 2x Anti Aliasing and 4x Anisotropic Filtering, and the rather more demanding 1,600x1,200 with 4xAA and 8xAF. For the high-end setups (X1900XT CrossFire, 7900GTX SLI and the 7950GX2) we also ran a third benchmark at 1,920 x 1440, with 4xAA and, where applicable, 16xAF, to see how hard the big hitters can swing. Finally, we re-ran the *F.E.A.R.* high-end test with an Athlon 64 3800+ to illustrate CPU limitation.
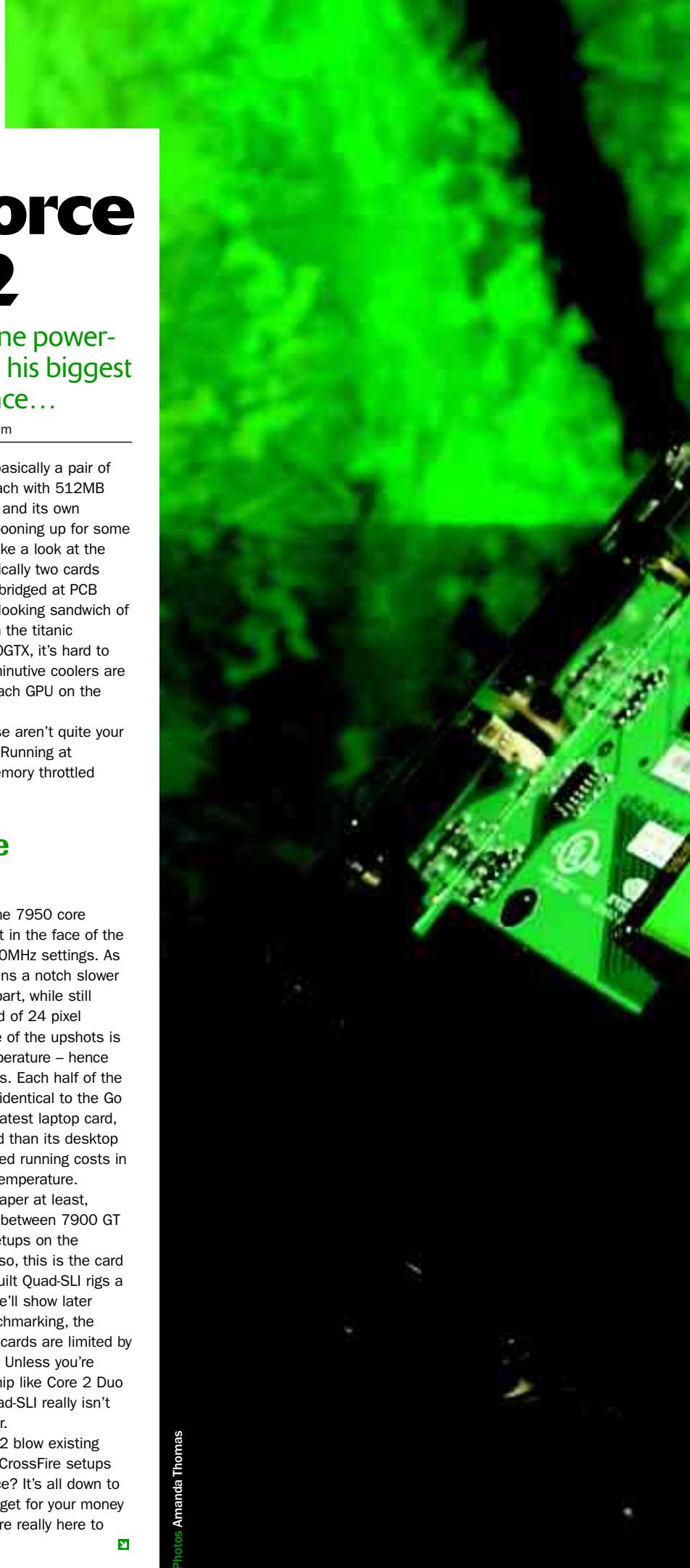
"Will the 7950 GX2 blow existing single card and SLI/CrossFire setups out of the marketplace?"

Analysis

Putting the GX2 head-to-head with its peers

As expected, the **7950** GX2 sits, performance-wise, between 7900GT and 7900GTX SLI setups, with a fair tip of the scales towards the GTX end of the power spectrum. Intriguingly, it's around the same price as a pair of the cheapest 7900GTs we can find. The difference between the GX2 and a pair of GTs in SLI is marked – very much in favour of the GX2, as the GT's, while offering equivalent framerates at lower resolutions, start running out of puff at the 1,600x1,200 mark. At this point, the GX2 comes on all Duracell, and keeps on going.

The performance differential between the GX2 and dual 7900 GTXs is minimal, only really making itself felt as a playability hit at 1,920x1,440, and then, only really in the most demanding games – ie *F.E.A.R.* and *Oblivion*. The GTX setup is more powerful – but not by

Wafer thin? Hardly. And this chunky monkey chuffs out some heat.

"The performance differential between the GX2 and dual 7900 GTXs is minimal"

an awful lot. And frankly, the GX2 smacks the panties off single cards in most tests; increasingly so as the resolution rises.The 7950 GX2 offers the best bang-for-buck at resolutions over 1,280x1,024. For the same price as a pair of GTs you get considerably better performance; for £250 less than the cheapest GTX pairing, you get nearly equivalent performance. It's a no-brainer.

The GX2 compares favourably with the ATI cards too, and it's only really X1900XT CrossFire that spanks the GX2 right across the board. ATI offers superior performance in *Oblivion*; a single XTX effortlessly outperforms the GX2 even at 16x12, though the tables are turned in *F.E.A.R.*, the GX2 beating even CrossFire at higher resolutions. The VGA setup you choose hinges upon your budget considerations and resolution requirements. You're better

TECH SPECS	GPU/RAM	GPU/RAM SPEEDS (MHz)	PIXEL PIPELINES	PRICE (£)
RADEON X1900 XT	R580/512MB GDDR3	625/1450MHz	16 (48)	280
RADEON X1900 XTX	R580/512MB GDDR3	650/1550	16 (48)	320
RADEON X1900 XTX CrossFire	R580/512MB GDDR3 (x2)	625/1450 (x2)	16 (48) (x2)	580
NVIDIA 7900GT	G71/512MB GDDR3	450/1320		190
NVIDIA 7900GTX	G71/512MB GDDR3	650/1600	24	320
NVIDIA 7900GT SLI	G71/512MB GDDR3 (x2)	450/1320 (x2)	24	380
NVIDIA 7900GTX SLI	G71/512MB GDDR3 (x2)	650/1600 (x2)	24	640
NVIDIA 7950 GX2	G71/512MB GDDR3 (x2)	500/1200 (x2)	24	375

off getting a single card if you're running at 1,280x1,024; the performance gains offered by a dual-card setup at this resolution don't impact gameplay much.

LIMITING FACTORS

The similar *Quake* scores show CPU limitation at work. Those higher-end cards could be working harder to break that boundary – if only the buck didn't stop with the processor. It's very apparent when you have CrossFire running, as you hardly hear those X1900XT coolers; they aren't working anywhere near their capacity. Compare it to a single X1900XTX at high resolution: the turbine howls, you can literally hear the GPU being pushed. To show how much reliance there is on the CPU at the high end, we ran additional benchmarks for the three high-end *F.E.A.R.* tests,

using an AMD Athlon 64 3800+. The result was noticeably lower on each count. CPUs need to be faster and that's where Conroe will slot into the equation.

Also, you'll notice some strange figures on the table between single and dual-card setups. A perfect example is the X1900XTX outscoring the CrossFire rig in *Oblivion* at 1,600x1,200 – by a good 23%, in fact. This is because CrossFire – and indeed SLI – carry a small processor overhead to keep the cards talking. Seems a shame that two cards, at the wrong resolution with the wrong game, can actually perform worse than a single card. But it's a rare occurrence – in 99% of situations, SLI and CrossFire eat single cards for

gold
PCFormat

Even with its diminutive coolers, the GX2 can be clocked to compete with a pair of 7900GTXs. Awesome.

Benchmarking the beasts
Watch the monsters growl their way through our gruelling tests

F.E.A.R. — 1,280x1,024 x2aa x4af: 79, 83, 114, 64, 83, 90, 98, 95

F.E.A.R. — 1,600x1,200 x4aa x8af: 49, 51, 64, 34, 46, 59, 77, 68

F.E.A.R. — 1,920x1,440 x4aa x16af: 54, 61, 56
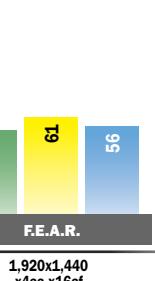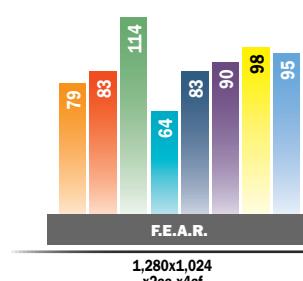
F.E.A.R.: Heavy shader-work means tough testing.

CPU limitation: similar FPS scores are a dead giveaway.

HALF LIFE 2: EPISODE 1 — 1,280x1,024 x2aa x4af: 97, 97, 97, 96, 103, 99, 98, 98

HALF LIFE 2: EPISODE 1 — 1,600x1,200 x4aa x8af: 75, 78, 99, 63, 86, 92, 98, 99

HALF LIFE 2: EPISODE 1 — 1,920x1,440 x4aa x16af: 93, 93, 82

HL2:E1: Few cards struggled with Valve's latest.

Dual-VGA can underperform next to single cards, due to the CPU overhead.
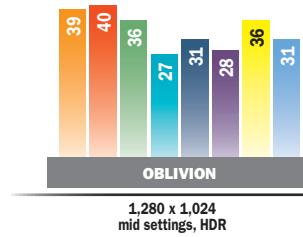
OBLIVION — 1,280 x 1,024 mid settings, HDR: 39, 40, 36, 27, 31, 28, 36, 31

OBLIVION — 1,600 x 1,200 high settings, HDR: 32, 37, 30, 19, 26, 25, 30, 29
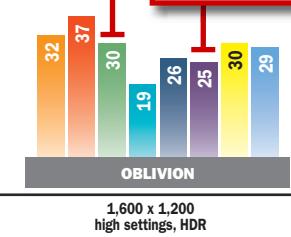
OBLIVION — 1,920 x 1,440 ultra settings, HDR: 23, 20, 23
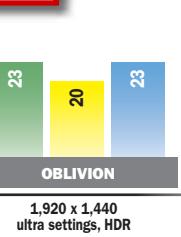
Oblivion: The toughest card-challenge there is.

QUAKE IV — 1,280x1,024 high settings, x2aa x4af: 105, 107, 108, 98, 101, 102, 101, 103

QUAKE IV — 1,600x1,200 high settings, x2aa x4af: 105, 106, 109, 80, 95, 102, 97, 103
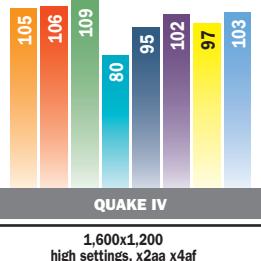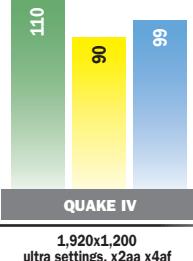
QUAKE IV — 1,920x1,200 ultra settings, x2aa x4af: 110, 90, 99

Quake IV: ATI has finally conquered OpenGL apps.

3D MARK06 — 1,280x1,024 HDR on: 5,581, 5,838, 8,540, 4,484, 5851, 7,635, 8,252, 7,582

3D MARK06 — 1,600x1,200 HDR on: 4,884, 5,116, 7,943, 2,675, 5,096, 6,407, 7,535, 6,782

3D MARK06 — 1,920x1,440 HDR on: 7,135, 6,473, 5,723
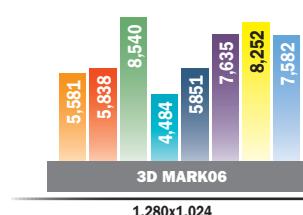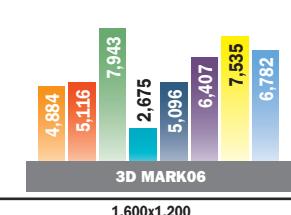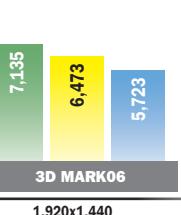
3DMark06: Offers a rough comparison, but useful.

DirectX 10
Unleashing the untapped power of GPUs

The DX10's unified shader model is a developers' dream, and will revolutionise the way graphics cards do what they do. The edited version is that DX10 will enable any given processor pipeline to perform any number of tasks, rather than simply lying idle when the task they're designed to perform isn't requested. GPUs will now work far more efficiently. It'll never happen in XP – it's Vista or bust and will require a specific DX10 card.

That's a way off yet – we can expect a new revision of DX9 graphics cards from both ATI and NVIDIA until then. If you want to find out more turn to p11 and our low-down on the current situation.
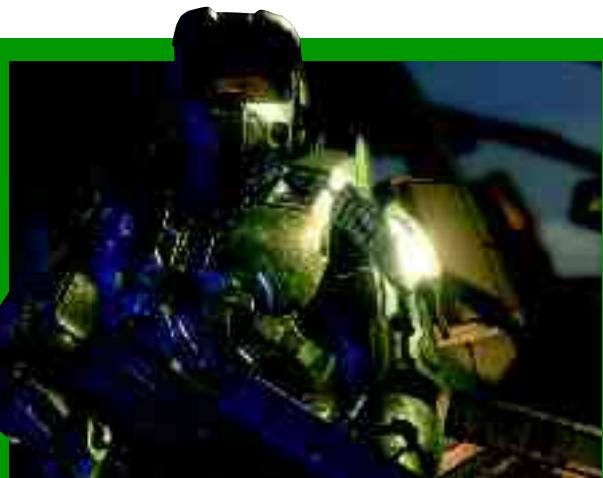
Quad-SLI
Much-vaunted – and much retiring. Is it all smoke and mirrors, or a reality worth shelling out on?

Yes, you can go and buy a Quad-SLI setup from certain system builders. Yes, the 7950 GX2 will eventually work with a second card for four-core madness, although at the moment, such a setup is unsupported by NVIDIA. At present, you can't get a pair of 7950s to work together at home; the drivers, still at Beta stage as we go to press, don't have quad-core compatibility built in, so anything you've read to the contrary is purely theoretical. If this graphics card test has proved anything, it's that performance bottlenecks at the CPU. You could put four, eight, 20 GPUs in a rig; you still won't get over 105-ish FPS in *Quake* without a fatter processor. And even then, how far can you go before bottlenecks occur elsewhere in the system? The only reason to consider Quad-SLI is that it'll drive megalomaniac displays, like Dell's 30-incher, at titanic resolutions, and games will still remain playable. And for 99.9% of us, that kind of outlay is just a financial pipe-dream.

Dell's Quad-SLI rig showcased in January with CPU bottlenecking.

Video quality
ATI's cards have traditionally ruled in terms of pure video quality. In the face of new NVIDIA hardware, is this still true?

So here's how it works. ATI cards can handle HDR and anti aliasing simultaneously, though performance is dreadful; NVIDIA cards still can't, and probably won't until the 8-series rears its head.

Both effects work in HL2:E1 on NVIDIA cards, but you can disregard this; it doesn't count, as the Source engine doesn't render true HDR, merely a series of effect routines that produce similar results. What's more, anti-aliasing effects on ATI's cores is simply rendered more cleanly than NVIDIA's.

Many NVIDIA users have reported a sort of minor sparkly, shimmery effect with AA turned on. Some of these image issues can be overcome by forcing high quality in the NVIDIA drivers, but whether the resulting image looks quite as good as an ATI card forced to high quality mode is not in question. ATI still has it in terms of pure eye-candy, and the ability to render up to 6x anti-aliasing makes a big difference. Observe...

ATI (left) NV (right) As you can see, the X1900XTX renders textures better into the distance. Look along the boardwalk and compare it with the GX2's flatter visuals.

Overclocking

It's powerful. But how much more powerful can it get? The answer is: considerably. And that's a great prospect.

Given its 2-in-1 design, the 7950GX2 isn't the kind of card you can simply bolt an aftermarket VGA cooler onto, so unless you're up for a serious dismantle-level fiddle-sesh, you're stuck with the stock coolers. And damn us all if they're not good for another 10 FPS at 1,600x1,200.

That's the fact of the matter. These underclocked cores want to be free… free enough to equal a pair of 7900 GTXs in SLI, if you're willing to put your money where our mouth is. Seriously. We got that 500/1200 MHz core clock and memory speed up to 595/1568 MHz before the computer said no. And that told us all we needed to know about G71; a single 7900 GTX is clocked at 650/1500 MHz, and we clocked the GPU within 55MHz of that target, and the memory 68 MHz past it. If this card had

better coolers for the memory and GPU, we're confident that each core would clock higher than the 7900GTX. Which would mean a theoretical card that undercuts a pair of 7900GTXs in SLI by several hundred pounds, and offers *the same performance*.

Working by increments with CoolBits (**snipurl.com/s1wp**), we achieved the above clock and memory speeds, which resulted in a stable *F.E.A.R.* benchmark of 77FPS at 1,600x1,200, with 4xAA and 8xAF. *Exactly the same score as a pair of 7900GTXs in SLI*. Whether this equality of performance stretches across the gamut of games, we cannot say… as we go to press, we simply haven't had time to test these clock settings with every game. But the bottom line is, this card has a lot of overclocking headroom in it… enough, perhaps, to equal one of the highest dual-card setups there is. Result.

NVIDIA 7900GT

NVIDIA 7900GTX

ATI Radeon X1900 XT

ATI Radeon X1900 XTX

AL's final thought…
Just the facts, Jack. This card's a doozie…

Here's the skinny: don't buy a CrossFire setup, SLI setup, or dual-GPU card if you're running at 1,280x1,024 – the native resolution of today's 17" and 19" flat-panels. Generally speaking, you won't see any appreciable gains, and in many cases, single cards actually perform better, as dual-card systems drop frames to the driver overhead. The bottom line is that dual-VGA systems are really only useful for gaming at 1,600x1,200 and upwards, the point at which low-end dual-VGA systems and single cards start running out of moxie.

With that in mind, be aware that the 7950GX2 is, to all intents and purposes, a high-end SLI setup. Nearly as good as a pair of 7900GTXs, for £250 less. It renders the 7900GT SLI setup obsolete, as it costs the same and outperforms it considerably at high resolutions. What's more, there's the promise of GX2-SLI further down the line – which could be ace providing you own a stonking processor. Moreover, if you're willing to experiment, you can pretty much equal a GTX setup through overclocking. As it stands, this is the absolute price sweet-spot for SLI, and Fiddler's Green for tweakers.

CrossFire with a pair of X1900s is still better for great framerates at retina-ripping resolutions. It just has more grunt under the hood, plain and simple.

However, it'll cost you around £580… which is expensive, but still cheaper than a pair of 7900GTXs. Place the XTXs beside the GX2, with its immensely overclockable cores and RAM, and the GTX SLI option also becomes obsolete.

Prices can and do fluctuate, often on a monthly basis. If you're looking for a dual-card setup for hi-res gaming with a price ceiling of £400, the 7950 GX2 is the only game in town right now, and this soon after release, we've seen examples

for as low as £375 inclusive of VAT. X1900XT CrossFire still offers more shunt at the top end, no question about it, but you'll pay £200 over above the GX2 for it. In short, the GX2 is a cracking card, and anyone looking for a high-res performance at an affordable price should give it strong consideration. **PCF**

92% **PCF says…** "Powerful, overlockable, and cheaper than any equivalent dual-card setup.

S3 Chrome S27

Popular 3d card maker reappears with a multiple GPU affair. The price, at least, is right…

Price £48 **Manufacturer** PC Partner **Web** www.s3graphics.com

Back when NVIDIA was in short trousers, S3 was a name to be reckoned with. Eventually battered into clockspeed submission by the big N, it was gobbled up by VIA and disappeared into the technological hinterland. But wait, what's this? New S3 Chrome graphics cards? Has VIA been holding on to a secret that is going to revolutionise gaming? Not yet. But if you're on a tight budget, or you'd at least like an underdog to cheer for, it's worth paying attention.

Looking at the specification, the S3 Graphics Chrome S27 ticks a lot of the right boxes. Fast core clock speed (700MHz), matched by a similarly high-paced 128-bit memory interface. Four vertex shaders and eight pixel shaders offer reasonable poke, and the usual triumvirate of DVI, VGA and S-Video outputs are present too. There's no need for an extra power cable, it's quiet, and sits happily in a single slot as well.

Most impressive of all, at least on paper, is MultiChrome – S3 Graphics' take on multiple GPU rendering. MultiChrome only supports alternate frame rendering though, and as a spoiler, the performance is fairly unexciting for a pair of cards. On the plus side, you can slide two S27s into any dual-slot motherboard – it really is an unfussy pairing (although in fairness we did use a VIA K8T900 for testing).

SHINY SHINY…

Now for the bad news: performance is weak. You're limited to Shader Model 2.0 rendering which limits the setup's lifespan considerably and makes it pointless for *F.E.A.R.*, *Oblivion* or pretty much anything set for release in the foreseeable future.

The S27 wallows around the bottom of the benchmark tables, too – *Far Cry* waddles along at 43fps, as does *Doom 3* at 46fps, and Half Life 2 at 38fps (all at 1,024x768). By comparison, you can expect a 6600GT (available for about £75) to knock out 72fps in *Far Cry*, 64fps in *Half-Life 2* and 62fps in *Doom 3*. We saw little improvement in *Far Cry* or *Doom 3* using MultiChrome, although

> "The Chrome S72 isn't really a card for hardcore gamers"

there were small increases at 1280x1024 up to 52fps in *Far Cry* and up to 51fps in *Doom 3*. Hardly worth the extra cash, and nowhere near the performance increase you can expect from a pair 6600s.

Ultimately, this isn't a card for gamers, despite its pretensions. The lack of SM3 support, coupled with the poor performance can't be justified by the low price tag. Gaming on a budget? Pick up a 6600 (GT if you can afford it). Don't give up on S3 Graphics just yet though – this does at least show that ATI and NVIDIA have another company yapping at their heels to grab some of the lucrative budget market. And with a bit more power and a move to Shader Model 3, Chrome could certainly snap at an ankle or two… **Alan Dexter**

BENCH MARKS	3DMARK 05	3DMARK 06	DOOM3 (FPS)	FAR CRY (FPS)	HL2 (FPS)
CHROME S27	2,879	918	46	43	38

Core	700MHz Chrome S27
Memory	128-bit 700MHz GDDR3 128MB
Vertex shaders	Four
Pixel Shaders	Eight
Outputs	DVI. VGA, S-Video

62% **PCF says…** "If you're on a tight budget, consider this… before buying something better."

Chips with everything

Intel's revolutionary Core 2 Duo processor takes on AMD's latest socket-AM2 Athlon 64s. Jeremy Laird sorts the prime processors from the chump chips

Tumbling prices, tons of choice and the first significant leap in PC processor performance in years. Has there ever been a better time to pick up a new proccie? Pedants among you feel free to put pen to postcard if the need overwhelms you. But for everyone else, let's simply enjoy the fact that the arrival of Core 2 Duo, Intel's fabulous new desktop CPU, has given the processor market a sharp kick to the soft and danglies.

Formerly known as Conroe, Core 2 Duo is the most exciting CPU in recent memory. It's faster, cooler running, more efficient and better optimised for today's applications than any other PC processor. More

"Formerly known as Conroe, Core 2 Duo is the most exciting CPU in recent memory"

importantly, however, Core 2 Duo puts Intel back on the map. And like or loathe Intel, that's great news for all of us, because a healthy Intel means increased competition with arch rival AMD, which in turn translates into faster development cycles and lower prices all round. Even if the next processor you buy isn't an Intel item, the very existence of Core 2 Duo guarantees the chip you do choose will be both cheaper and faster than it otherwise would have been.

IMPACT ANALYSIS
In fact, the impact of Conroe is already upon us. Prices of Intel's outgoing Pentium D chips are in free fall and AMD has been forced to abandon its premium positioning

for many of its dual-core Athlon 64 X2 CPUs. All good news which leaves you with just one problem: which particular processor to plump for? Currently, that's a very tricky question to answer.

The combined current output of AMD and Intel includes everything from bargain basement single-core chips and budget dual-core processors to highfalutin', uber-clocked dual-core monsters. Making the mix even more mystifying, Intel is offering its outgoing Pentium D and new-fangled Core 2 Duo chips side by side, while AMD is also in a state of transition thanks to the recent introduction of the new AM2 processor socket and support for DDR2 memory. Finding the sweet spot in terms of price and performance that matches your budget is more difficult than ever.

Which is where this month's essential CPU round up steps in. We've rustled up 10 of the best sensibly priced, real-world desktop processors on the market and benchmarked them to breaking point. As well as a few choice synthetic tests, we've assessed performance in the real world applications that matter most to *PCF* readers, So, that's games and demanding multi-media

tasks, including that most ruthless destroyer of CPUs: high definition H.264 video decoding.

HOT DEBATE
Of course, with small form factor and living room-dwelling lifestyle systems more popular than ever, a hot and bothered CPU can be a serious liability. We've therefore also investigated the operating temperature of each chip under an extreme load.

Not forgetting the enthusiast contingent, we've performed a detailed overclocking analysis on a number of key chips. Without giving too much away, there are one or two genuine sub-£200 giant killers in this group test that deliver a performance that outstrips the fastest £600 super-CPUs of just a few months ago. Finally, for those looking for the best all-round

We've been trumpeting the arrival of Conroe for some time, but don't dismiss AMD's Athlon range.

solution rather than the killer choice for a single application type, we have a more balanced overall bang-for-buck rating.

As for specifics, our AMD gathering includes a pair of poverty-priced single-core chips, the Sempron 3600+ and Athlon 64 3800+, and a trio of dual-core Athlon 64 X2 chips, the 4000+, 4400+ and 4800+. It's worth noting that each and every one of these processors is tested in socket-AM2 configuration, but similarly performing equivalents for all except the X2 4000+ and Sempron 3600+ are available in the socket-939 form factor. Representing Intel, we've the fastest mainstream Conroe, the 2.66GHz Core 2 Duo E6700 as well

What Watt?
The importance of power ratings

If there's a single metric that best defines the failure of Intel's outgoing Pentium 4 Netburst processors, power consumption is surely it. With Thermal Design Power (TDP) ratings of up 130W, Pentium D processors are serious juice junkies that put enormous strain on key components such as motherboards and PSUs.

The contrast with AMD's relatively parsimonious Athlon 64 chips is all too obvious (note that AMD's power ratings are significantly more conservative than the Intel TDP figure – the gap between a 130W Pentium D and a 125W Athlon 64 FX-62, for

instance, is much bigger than the raw numbers suggest).

However, with the release of Core 2 Duo, Intel has turned the tables on its old enemy. The fastest 2.66GHz Core 2 Duo on test this month is rated at just 65W. AMD, meanwhile, has countered with a new range of special power-efficient Athlon 64 X2 chips. For a small price premium, each one of the 4000+, 4400+ and 4800+ models tested here in 89W configuration is also available in 65W trim. That's handy whether you're building a low-power small form factor system or simply trying to prevent your desktop from buckling under the strain of a high end CPU and a pair of powerful video cards.

two of the cheaper Core 2 Duos in the shape of the E6300 2.13GHz and E6200 1.83GHz models, both of the latter two running cut-down 2MB cache memory pools. To put those new processors into perspective, we've thrown in an old-school single-core Pentium 4 560 and the cheapest dual-core chip in Christendom, the Pentium D 805. It's a great cross section of the best affordable CPUs around. We've excluded the silly-money Intel Extreme Edition and AMD FX CPUs. They may make for great headlines and top the outright performance league tables, but in terms of old fashioned value for money, they're not even in the right ball park.

Insider knowledge
What's under the hood of your chosen CPU…

	AMD SEMPRON 3600+ AM2	AMD ATHLON 64 3800+ AM2	AMD ATHLON 64 X2 4000+ AM2	AMD ATHLON 64 X2 4400+ AM2	AMD ATHLON 64 X2 4800+ AM2	INTEL PENTIUM 4 560	INTEL PENTIUM D 805	INTEL CORE 2 DUO E6300	INTEL CORE 2 DUO E6400	INTEL CORE 2 DUO E6700
Core configuration	Single-core	Single-core	Dual-core	Dual-core	Dual-core	Single-core	Dual-core	Dual-core	Dual-core	Dual-core
Clockspeed	2.0GHz	2.4GHz	2.0GHz	2.2GHz	2.4GHz	3.6GHz	2.66GHz	1.86GHz	2.13GHz	2.66GHz
Socket	AM2	AM2	AM2	AM2	AM2	LGA775	LGA775	LGA775	LGA775	LGA775
Process technology	90nm SOI	90nm SOI	90nm SOI	90nm SOI	90nm SOI	65nm strained silicon	65nm strained silicon	65nm strained silicon	65nm strained silicon	65nm strained silicon
L2 cache memory	256k	512k	2x 1MB	2x 1MB	2x 1MB	1MB	2x 1MB	2MB	2MB	4MB
Instruction pipeline	12/17 stages (int/fp)	12/17 stages (int/fp)	12/17 stages (int/fp)	12/17 stages (int/fp)	12/17 stages (int/fp)	31 stages	31 stages	14 stages	14 stages	14 stages
64-bit data support?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power rating	62W	89W	89W	89W	89W	115W	95W	65W	65W	65W
Motherboard chipset support	NVIDIA NForce 590, ATI Xpress 3200	NVIDIA NForce 590, ATI Xpress 3200	NVIDIA NForce 590, ATI Xpress 3200	NVIDIA NForce 590, ATI Xpress 3200	NVIDIA NForce 590, ATI Xpress 3200	Intel 915, 925, 945, 955, 965, 975	Intel 945, 955, 965, 975	Intel 965, 975	Intel 965, 975	Intel 965, 975

Clockspeed counts
Putting the squeeze on Intel and AMD's new babies

Slap on a water cooler, wind up the voltage and brace yourself for impact. That's the overclocking enthusiast's mantra. Here on PCF, however, we realise that for most mere mortals overclocking is usually a case of making do with your existing cooling.

With that in mind, we've kept our tests as realistic as possible. We've used only standard, low end air cooling solutions and limited our BIOS tweaking to the processor bus speed. In other words, our results are the minimum you can expect from these chips. So, what kind of clocks can Intel's new killer crank out? Unfortunately, we can't give you a definitive answer.

The 975XBX motherboard Intel provided for our tests isn't the most enthusiast-friendly item, restricting overclocking rates to 30 per cent. And that's a level the cheapest 1.86GHz Core 2 Duo E6300 reaches with ease. But try this for size: the resulting 2.4GHz clockspeed delivers processing punch superior to the fastest CPU AMD currently offers, the ludicrously expensive Athlon 64 FX-62. That's a staggering result for a £140 chip. More importantly, it also makes Intel's other bargain basement dual-core chip, the Pentium D 805 thoroughly redundant. With both chips running at the maximum overclock our test platform allowed, the Core 2 Duo is as much as 50 per cent quicker. With less than £40 separating them, it's no contest.

Further up the Conroe range, the 2.66GHz E6700 chip puts in an equally impressive 3.2GHz performance. At that clockspeed, Core 2 Duo is utterly untouchable, tearing through our media encode test and spewing out by far the fastest Far Cry frame rates we've ever seen. As for AMD's offerings, the new 4000+ Athlon 64 X2 model looks like the weapon of choice for overclocking fans. A 40 per cent clockspeed boost on stock cooling and voltages is a fabulous result and incredibly, it's actually slightly faster than its much more expensive 4800+ stable mate.

Impressive though that is, however, it ain't enough to match Intel's awesome entry-level Core 2 Duo – especially when you consider that the E6300 will almost definitely go quicker than 2.4GHz.

KEY

- AMD Athlon 64 X2 4000+ AM2 @ 2.8GHz
- AMD Athlon 64 X2 4800+ AM2 @2.75GHz
- Intel Pentium D 805 @ 3.5GHz
- Intel Core 2 Duo E6300 @ 2.4GHz
- Intel Core 2 Duo zE6700 @ 3.2GHz
- AMD Athlon 64 FX-62**

WMV9 VIDEO ENCODE
01:58 | 02:00 | 02:43 | 01:56 | 02:01 | 01:32

FAR CRY
101 | 98 | 73 | 112 | 130 | 94

SISOFT MEMORY BANDWIDTH
9,387 | 8,502 | 4,063 | 6,037 | 5,809 | 7,681
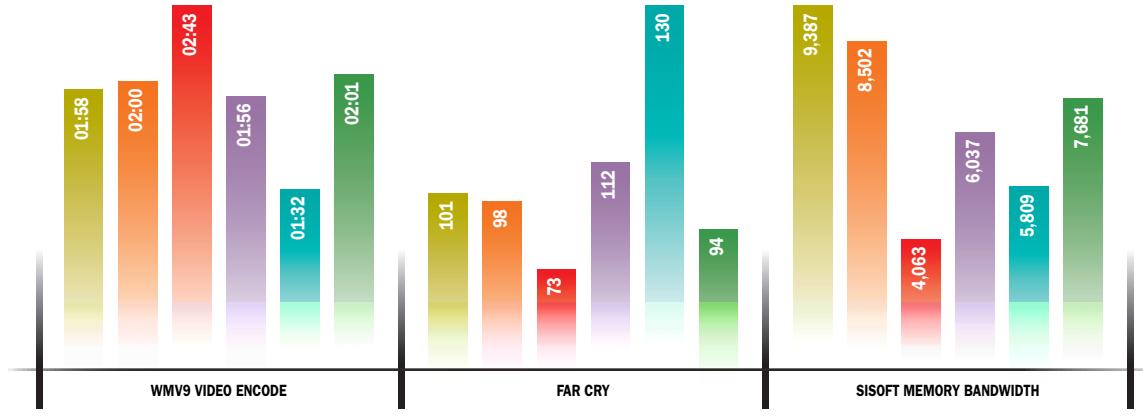
**AMD Athlon 64 FX-62 @ standard clockspeed provided for comparison

How we tested
Pokey chips require a hefty spanking. Here are the paddles we used

The PCF test-bed for benchmarking these CPUs comprised a gigabyte of the fastest supported DDR2 memory for each chip, an NVIDIA GeForce 7900 GTX, a fast SATA II hard drive and, of course, Windows XP SP2. Unlike other, rather more specific-task orientated components (such as graphics cards), CPUs have to perform stacks of different operations, so we threw the entire gamut of test metrics at them. We wanted to see how efficiently they encoded and decoded media, how well they handled memory and data throughput and, of course, how much performance they bring to games. As you can see, the new kid on the block trashes the competition at everything, making it a sterling purchase for pretty much anything you care to do with your PC. Read on to find out more...

KEY

AMD Sempron 3600+ AM2	Intel Pentium 4 560
AMD Athlon 64 3800+ AM2	Intel Pentium D 805
AMD Athlon 64 X2 4000+ AM2	Intel Core 2 Duo E6300
AMD Athlon 64 X2 4400+ AM2	Intel Core 2 Duo E6400
AMD Athlon 64 X2 4800+ AM2	Intel Core 2 Duo E6700

PCMark05
Overall system scores (PC Marks)

- 3,811
- 4,306
- 5,039
- 5,476
- 5,741
- 4,648
- 4,722
- 5,890
- 6,002
- 7,018
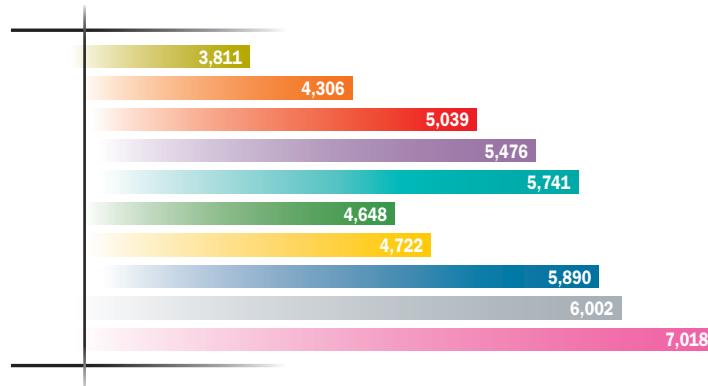
Sisoft Sandra
Memory bandwidth test (MB/s)

- 5,337
- 6,246
- 6,695
- 6,586
- 7,294
- 4,274
- 3,057
- 4,753
- 4,675
- 4,779
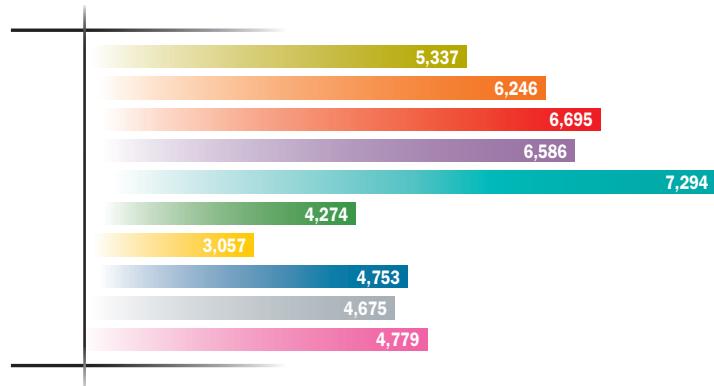
H.264 1080p video
H.264 1080p video decode (CPU time)

- 72% (92% peak)*
- 67% (89% peak)*
- 50% (65% peak)
- 48% (63% peak)
- 45% (59% peak)
- 62% (83% peak)*
- 61% (80% peak)*
- 35% (48% peak)
- 34% (46% peak)
- 32% (41% peak)
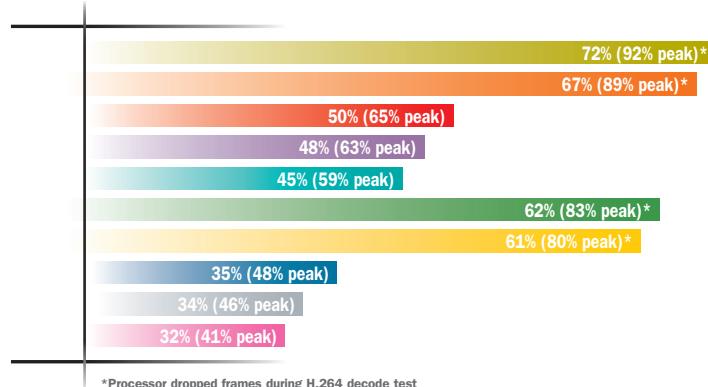
*Processor dropped frames during H.264 decode test

WMV9 video encod
WMV9 video encode (m:sec)

- 05:13
- 04:22
- 02:44
- 02:33
- 02:19
- 04:09
- 03:34
- 02:28
- 02:15
- 01:51

Half-Life 2: Lost Coast
Gameplay frames-per-second

- 67
- 83
- 91
- 95
- 108
- 70
- 62
- 104
- 111
- 149
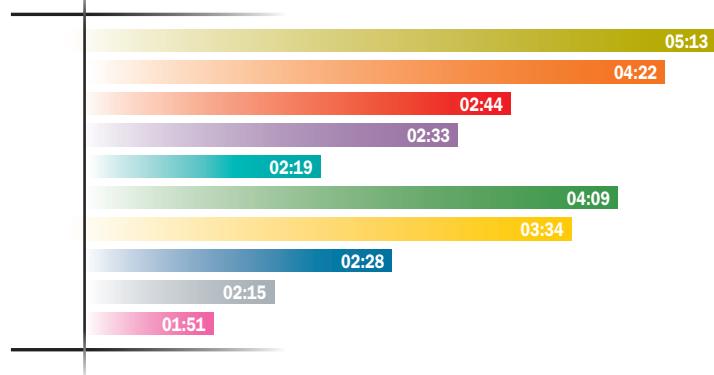
Far Cry
Gameplay frames-per-second

- 55
- 70
- 71
- 75
- 83
- 63
- 54
- 86
- 89
- 107
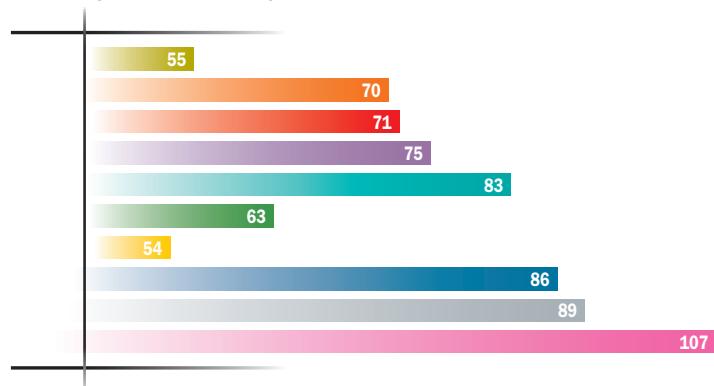
More for your money
Stock-clocked bang for buck

Outright performance is all very well. But when it comes to PC components, spending more often means getting less – at least in terms of value for money. To get a handle on the all-important bang-for-buck ratio, therefore, we towering intellects at *PCF* have performed a pair of cranial crunching calculations. For each chip, we've worked out the cost you'll be paying for a single rendered frame in *Half-Life 2: Lost Coast* and for 100 points in Futuremark's *PCMark05* benchmark suite. The results make for sobering reading. Our bang-for-buck tests were conducted at standard operating frequencies.

Chilly chips
How hot are the latest CPUs?

Estimated street price*
Results that will make your wallet shudder

Bar chart (Estimated street price):
- £60
- £75
- £175
- £225
- £275
- N/A
- £75
- £140
- £165
- £350

Bar chart (Chilly chips): 43, 30, 45, 45, 46, 71, 60, 46, 48, 49
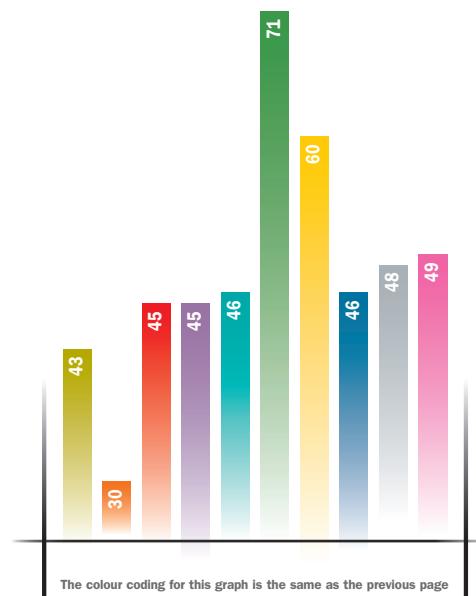
The colour coding for this graph is the same as the previous page

|	AMD SEMPRON 3600+ AM2	AMD ATHLON 64 3800+ AM2	AMD ATHLON 64 X2 4000+ AM2	AMD ATHLON 64 X2 4400+ AM2	AMD ATHLON 64 X2 4800+ AM2	INTEL PENTIUM 4 560	INTEL PENTIUM D 805	INTEL CORE 2 DUO E6300	INTEL CORE 2 DUO E6400	INTEL CORE 2 DUO E6700
Cost per frame, Half-Life 2	89p	90p	£1.92	£2.37	£2.55	N/A	£1.21	£1.35	£1.49	£2.35
Cost per 100pts, PCMark05	£1.58	£1.74	£2.50	£4.09	£4.82	N/A	£1.60	£2.37	£2.75	£5

Conclusion
Its fast, its furious and its leading the way into the future

Make no mistake, Intel's Core 2 Duo is an awesome achievement. Thanks to our preview back in *PCF187*, of course, we already knew that high-clocking variants of the new Conroe core were fantastic performers. At stock clockspeeds, the Core 2 Duo E6700 not only utterly humiliates its similarly-priced AMD competition, the Athlon 64 4800+, it's also quicker than the very finest chip AMD currently offers, the FX-62. Overclocked to 3.2GHz, the E6700 is by far the fastest processor we've ever seen.

But breathtaking though the E6700 undoubtedly is, it's not the most impressive member of the new Core 2 Duo range. That accolade goes to the little chip that can, the Core 2 Duo E6300. We'll say it here and we'll say it now: assuming our review sample is fully representative of retail chips and that Intel hits our estimated £140 price point, the E6300 is surely the best PC processor ever made. How else can we describe a £125 processor that is capable of out performing the previous fastest CPU on the planet? It's cutting-edge PC performance for the masses. With just 2MB of on-die storage, it also entirely expunges rumours that Intel's new architecture is heavily dependent on cache memory for high performance.

AND THEN?
So, what hope for AMD? As far as we can see, Conroe kills AMD's mainstream and high-end Athlon 64 X2s stone dead. Further down the range, however, AMD looks much more competitive. In isolation, the Athlon 64 X2 4000+ is a very nice little chip. It boasts the full Opteron-matching complement of 1MB cache per core and delivers extremely impressive overclocking headroom. There's certainly no sane reason to spend a single penny more on any other standard-Wattage Athlon 64 X2. As for AMD's new low-power dual-core chips, the jury remains out. Unfortunately, AMD was unable to provide us with samples.

Finally, the arrival of Core 2 Duo also puts the final nail into the coffin of single-core processors. Why pay £80 or so for a barely respectable single-core chip when £140 buys you all the dual-core performance you could ever

The writing could be on the wall for all other chips. Intel offers price, performance and overclockability.

ROUND-UP

Happy medium

Perpendicular storage? Straight up it is. Dave James finds out how this new hard drive technology stacks up against traditional storage media

HOW WE TESTED

Where hard drives are concerned, the old adage 'bigger is best' has always rung true as capacity is linked with performance. Higher capacity drives, due to the bits being closer together, have always been faster. We wanted to see if this was still the case with the latest advances, so we lined the Barracuda against some high-capacity contemporaries. Realistically for the consumer, one of the most important stats is the price per gigabyte, but to give an accurate picture of each drive's performance we also ran them through three benchmarking procedures using HD Tach from **www. simplisoftware.com**. We measured the CPU usage, average read-times, random access times and burst speed between the CPU and drive itself.

Superparamagnetism. Even though the sound of it is something quite atrocious, it's occupied the big brains in magnetic storage for the past 10 years or so. An exponential increase in storage demands has meant that hard drives have shrunk the size of the magnetic grains that form data bits in order to effect this increase in volume.

It was never much of a problem until the recent explosion in portable devices, such as sat navs and MP3 players, many of which contain hard drives. Now we want 30 years' worth of music to be stored on a device no bigger than a digital watch. This is where the spectre of superparamagnetism raises its hideous visage, proclaiming portents of doom for the future of miniature storage. The problem is that if you continue to shrink the 100-odd little grains that make up a bit, they eventually become so small that microscopic vibrations cause them to lose

their magnetic charge. Essentially, the smaller they get, the less stable the storage becomes, which is something that manufacturers and consumers simply cannot accept. Hard drive manufacturers have known about this impending problem since the 1970s and have been investigating methods of increasing capacity while retaining integrity.

Perpendicular storage has become the popular choice of the professional; check out the boxout on p72. Toshiba was the first to release a commercially available drive, but it was fraught with reliability problems. Seagate stepped in and produced the first 3.5-inch drive earlier this year and it has now brought us the largest capacity 3.5-inch drive available: the Barracuda 7200.10. We've stacked it up against the highest capacity drives from three of the other top manufacturers to see how their horizontal storage drives compare to the latest in perpendicular technology.

Caviar SE16   £161

Manufacturer Western Digital   **Web** www.wdc.com

The Western Digital drive proved to be the most awkward drive to set up, requiring assorted jumper shenanigans to get our PC to even recognise the drive. Performance-wise however, it came out on top. At 32p per GB, it's the best value drive in the test and, with an average read time of 62MB/sec, is the second fastest too. The only place where this drive falls down is in its burst speed. This is the maximum speed that data can transfer between the device and the CPU, and the Caviar is the only drive to drop below the 130MB/sec mark, coming in at around 127MB/sec. However, it offers good value for money, and outperforms the other horizontal storage media in our test and scores well in all the areas that count.

Capacity	500GB
Price per GB	32p
Average Read Time	62.2MB/sec
Random Access Time	13.2ms

81% **PCF says...** "If you really can't stretch your budget to the Barracuda, then this is the only other choice."

Deskstar 7K500   £178

Manufacturer Hitachi   **Web** www.scan.co.uk

It stands to reason that the oldest drive in our test should also be the weakest, and thus the good ol' Deathstar duly delivers. In the important value stakes it's second only to the Barracuda as the most expensive at 36p p/Gb, and also clocks as the slowest in average read times. Strangely though, it comes up trumps in the random access test. This is the time it takes to retrieve a piece of data from a randomly selected sector on the drive. This means that the Hitachi drive does win the efficiency award, especially coupled with the lowest CPU overhead on the test at 2.6%. Unfortunately it still lags way behind the Caviar, and at this price, simply cannot compete with the other drives.

Capacity	500GB
Price per GB	36p
Average Read Time	51.2MB/sec
Random Access Time	12.6ms

70% **PCF says...** "This old dog doesn't have the requisite new tricks to make it worth a look and is hampered by its price."

DiamondMax 11   £163

Manufacturer Maxtor   **Web** www.maxtor.com

After the acquisition of Maxtor by its rival Seagate, the two companies are set to merge completely by the end of the year. Until then though, they'll continue to operate as separate entities in the market. From the rather average performance of the latest DiamondMax, though, it looks like that change can't come soon enough. In terms of price per GB it manages a very decent 33p, but falls short of the top drives in almost all the other areas. Its random-access time of 18.5ms is the slowest in the test, almost 5ms; so in productivity and efficiency terms it doesn't compete. It's a very average drive; not bad, but doesn't stand out either, especially when you compare it to Maxtor's new daddy, the Seagate.

|	
Capacity	500GB
Price per GB	33p
Average Read Time	57.8MB/sec
Random Access Time	18.5ms

77% **PCF says...** "A decent drive at a decent price, but the average test scores means it loses out overall."

Turn over for the winner...

BARRACUDA VS CAVIAR

Complete *HD Tach* graphs for all of the drives tested here can be found online at blog.pcformat.co.uk.

Straight up
What it all means…

Until very recently, all hard drives stored their data longitudinally, with each magnetic grain lying horizontally to the surface of the disc platter. This was fine until the notion of superparamagnetism was floated as an end point to the growth of storage media.

Perpendicular storage was first demonstrated by a Danish scientist as a way to store information magnetically way back in the 19th century! It wasn't until the mid seventies though, when the man heralded as the father of modern perpendicular storage, Dr Shun-ichi Iwasaki, showed the advantages of perpendicular storage. It basically means that, instead of lying down as before, each grain is orientated vertically. This allows far more bits to occupy the same area without reducing the size of the grains, and therefore not cramming more data into the same space without arousing the ire of superparamagnetism.

Currently, the general consensus is that the longitudinal capacity limit lies around the 100-150 Gbit/inch^2. Using perpendicular arrangements however, drives have been created with as much as 230 Gbit/^{2}. It's largely expected that by the end of next year, the switch to this new method of storage will be universal – until holographic data storage becomes a truly viable proposition, that is...
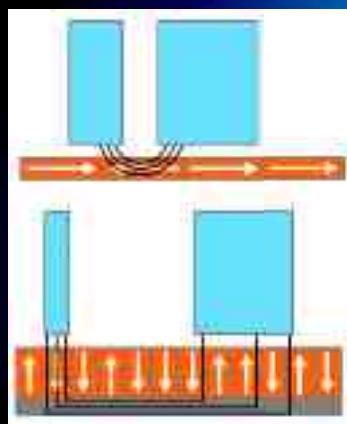
The top image shows the traditional hard drive head reading horizontal data bits, and below is perpendicular.

top gear PCFormat

WINNER!

Barracuda 7200.10 £275
Manufacturer Seagate **Web** www.seagate.com

With any implementation of new technology you inevitably end up paying a premium and the Barracuda is the most expensive drive in the test, although the cost of 37p per GB isn't as bad as the £275 price tag might at first suggest. It's the fastest drive, thanks to the more tightly packed data in its perpendicular platters.

But not by as much as we'd hoped. At 67MB/sec it's only 5MB/sec faster than the Caviar. In essence, it seems perpendicular recording is mainly about increased storage. It's also backed up by Seagate's massive 5 year warranty. Hardly the performance revolution we'd hoped for, but its inception does facilitate the giant drives of the future.

Capacity 750GB

Price per GB 37p

Average Read Time 66.8MB/sec

Random Access Time 13.7ms

86% **PCF says…** "The biggest – and best – drive on the market. Not the fastest in every area, but it's got it where it counts."

FASHION TV

Acer AT3205-DTV

In a market where the label is as important as anything else, can Acer's off-the-peg screen measure up?

Price £899   **Manufacturer** Acer   **Web** www.acer.co.uk

The AT3205-DTV is the second biggest LCD TV in Acer's Summer catalogue (surpassed only by a 37" model) and shares the same conservative styling that marks out its projectors as best suited for corporate use. You can see it clearly aping Panasonic's Viera range with the subtle curved base and top and bottom edges to the frame, but without access to the same quality tailor.

It's a Moss Bros suit in an Armani world: you get a good look for a price that doesn't involve credit terms that make Ethiopia's look favourable. You can pick up the Acer for around £820 if you shop around online; a similarly-specced 32" LCD Viera weighs in at nearer a grand. Granted, the Acer might not fit so snugly into your living room, but once it's on you won't notice. The picture quality is incredible for the price, with a robust brightness and colour depth that show the AT3205's monitor roots. There is a tendency for pictures to be too dark, and the half-dozen presets all need tweaking to avoid poorly-detailed blacks from dominating the screen. Once you've cracked that (via one of the easiest on-screen set-up menus we've had a

chance to try) you're looking sharp. Playing HD content, whether it's from your PC, Xbox 360 or HDTV box, is sheer joy, reminding you just why you got so excited about those two consonants in the first place.

FLAT OUT

The contrast ratio of 800:1 shouldn't stand up to the Sonys and Panasonics of this world, but in practice you can't really make out any difference between them. Dark coloured objects sometimes lose detail on all screens, leaving you

with a Batman-shaped silhouette, rather than a buff Christian Bale.

The bolt-on stereo speakers are also surprisingly good. Acer has thrown in everything that you could possibly need in a HD-ready LCD television, from the praise-worthy range of connections to a sharpness in non-HD pictures (it even has an integrated Freeview digital tuner with SPDIF audio output) that's equal to other LCD screens costing substantially more.   **Mike Abolins**

Nice stitching
Ready to rock in a world rolling with HD

The AT3205-DTV is HD compatible, but due to the resolution, you are confined to the 720p standard. It actually offers a better quality image than 1080i, though as interlacing can introduce flicker. Sky's HDTV service supports both 720p and 1080i, as does the NTL/Telewest offering.

Screen size	32"
Resolution	1,366x768
Brightness	500 nits
Contrast ratio	800:1
Display colours	16.7 million
Response time	16ms
Viewing angle	170 degrees H and V
Inputs	Analog RF in, digital RF in, VGA, DVI, HDMI, component video, 3 x SCART (2 x RGB), 2 x composite video, S-Video
Outputs	SPDIF, composite video, stereo audio, 3.5mm headphone minijack
Dimensions	1,045x642x231mm

84% **PCF says...** "A great screen that, some issues aside, exceeds its price tag."

top gear PCFormat

WICKEDLY WIFI

Wireless G+ MIMO Router

WiFi to your neighbourhood with Belkin's latest take on the 802.11g standard

Price £90 **Manufacturer** Belkin **Web** www.belkin.com/uk

The big benefit of 802.11n, when it arrives, will be the data rate; theoretically it can hit 540Mbps or even higher, 10 times the standard 802.11g speed of 54Mbps. You'll need to wait for 12 months at least for that (even Belkin's own Pre-N router can't manage more than 324Mbps max), but you can enjoy one other upside of the new standard today, MIMO.

Multiple Input Multiple Output technology means that the range of a wireless network can be increased massively and Belkin claims that this, its enhanced 802.11g router, will reach 300 metres outdoors. It works by using a pair of antenna in conjunction, rather than the network choosing whichever of the two is providing the best signal, and bouncing radio waves off whatever surfaces are available (something called multipath propogation).

WIDENING GYRE

If you're upgrading from an 802.11b router, the difference is immediate and dramatic; coverage blackspots around the house disappear and dropped connections as you venture outdoors are a thing of the past. It really does provide as wide a coverage as you could need. With this router stationed by a window, we drove 150m down to the end of our street, losing the connection only by turning a corner.

Running at up to 108Mbps, it's twice the usual .11g rate with a compatible NIC, but you can get faster, consider Buffalo's Draft-N, to the right. Which means that the Wireless G+ is sitting in a strange area; you can get cheaper 802.11g kit that's adequate for broadband and basic networking, while Belkin's Pre-N router is just £10 more. So while there's nothing wrong with this wireless router per se, there's no overwhelming reason to buy it instead of something else, either.   **Mike Abolins**

Standard compliance 802.11g, 802.11b

Antennae Two

Encryption WPA, WPA2, 128/64-bit WEP, MAC address filtering

LAN ports 4 x 10/100Mbps

Security dynamic packet filtering, intrusion detector, NAT/SPI firewall

Indoor range 150m (quoted)

Outdoor range 300m (quoted)

81% **PCF says...** "Peerless range but little else to lift it above competitors."

DATA HERDING

AirStation Nfiniti WZR-G300N

If you can't wait for 802.11n to be finalised, Buffalo will take you to Nfiniti and beyond

Price £110 **Manufacturer** Buffalo **Web** www.buffalotech.com

Basing any piece of technology on draft specification is risky, particularly when it's not due for final ratification until the summer of 2007. But Buffalo isn't worried, and has bundled an interpretation of the 802.11n wireless standard into its new Nfiniti kit. While offering only half the ten-fold increase that's theoretically going to be available from 802.11n over 802.11g, the Nfiniti's 270Mbps data rate is impressive and streaming video throughout your home is much, much improved.

The three antennas that enable the MIMO (Multiple Input Multiple Output) capabilities almost induced us to trespass into our neighbour's garden, having easily reached the boundary of ours without a single blackspot or dropped connection.

STREAMS AHEAD

You will need the obligatory Draft-N NIC in your PC; while the Nfiniti router is backwards compatible with older 802.11b/g kit, you're still limited to the prior standard's spec if you rely on it. You're also unable to take advantage of the router's other gimmicks (the cynics among you could argue the entire thing is one big gimmick) such as the one-click set-up for encryption, where you press a button on the router and then click on an icon your Draft-N enabled PC, bypassing passwords and hexadecimal codes altogether.

It's a smart feature but we wonder, really, if anyone who buys the Nfiniti router will use it. After all, if you're desperate enough for wireless bandwidth to get an 802.11n router before the standard's even been finalised and with just half the potential connection speed, odds are you're grown-up enough to not rely on a hardware manufacturer's default security settings. But still, that 270Mbps data rate is hard to ignore, especially at this price and the three antennas mean you get better reception than its Belkin Pre-N rival.   **Mike Abolins**

Standard compliance draft 802.11n, 802.11g, 802.11b

Frequency range 2.412 – 2.462GHz (channels 1 through 11)

Antennae Three

Encryption WPA-PSK (AES), 128/64-bit WEP, MAC address registration

LAN ports 4 x 10/100Mbps auto-sensing

WAN port 1 x 10/100Mbps auto-sensing

Security dynamic packet filtering, intrusion detector, NAT/SPI firewall

87% **PCF says...** "Fast but not worth buying just to replace next summer."

Snap happy

Richard Stevenson throws away his Box Brownie to test five of the hottest digital cameras on the market

Just 10 years ago, buying a compact camera meant a staid 35mm film model from one of just half a dozen manufacturers. Other than the focal length and motorised extension of your zoom lens, there wasn't really much to get excited about.

Oh, how things have changed. The advent of digital photography brought consumer electronics manufacturers into the mix and created a market full of capable digicams, all competing for your cash. A fabulous scenario for the man in the street, with vertically spiralling technology, constantly falling prices and features lists that seemed to grow longer by the week. Until recently, cameras followed the typical technology trend. The must-have of the day soon became yesterday's lemon, and the real photography enthusiast replaced his snapper more often than his underpants. A remarkable similarity with PC development, as no doubt many of our readers using a stack of disused tower cases as a desk might testify.

LESS ZOOM
But, like the PC market, there has been something of a levelling out and a slowing down of core technology in recent times. Today, even base-model digital cameras offer resolution greater than most people will ever need, a host of useful features are less confusing than a two-piece jigsaw. With every high street and online photographic shop offering direct digital-to-print services, you don't even need a PC at home to get the best from a digital camera.

That doesn't make choosing one digital camera from among the thousands of alternatives on the market any easier, of course. To make sure you get the model that is right for you, do your homework first. Choose features that suit your camera use – be it general photography, snap-happy parties and holidays, still life, wildlife, or Westlife.

THE F-STOPS HERE
Irrespective of your subject matter, there are some constants to look out for, and indeed avoid. Look for fast recycle and response times, an easy to follow menu system, portability, good battery life and a high quality lens with a wide aperture (represented by a low F number) and long optical zoom for best results. A large, bright LCD is also desirable, not only for accurate framing and immediate reviewing of your handiwork, but also for showing your favourite pictures to friends and relatives. Oh, how we laugh every time at the snapshot of Tech Ed Al dancing on a table at the *PCFormat* Christmas party.

Of the features not to get excited about, digital zoom is number one. You will always get far better results zooming optically (that is, physically changing the length of the lens), then allow the second-rate onboard CPU to guess at a few pixels. If you need to crop and resize later, do it on your PC Sadly, the digital camera's bundled software is unlikely be get great results, so go for Adobe *Photoshop Elements* or JASC's *Paint Shop Pro* if you want to get creative.

Now is definitely the time to upgrade to a digital camera that will see you long into the future. As for which one will suit you, our digital camera test should help you narrow your focus.

HOW WE TESTED
Our essential criteria

Faced with five of the most feature-laden digital cameras on the market we did what most buyers will do… left the manual in the box and went out to take some snaps.

Each camera was charged and set up on the fly, and a range of basic subjects chosen. These included colourful flower petals in early morning light, dark-limbed trees against a white building and a moving object – namely Willow, a hyperactive 12 week-old puppy. We picked a scenic Sussex vista to test the range and quality of each zoom lens, a high contrast 'into the sun' scene to pressure the camera's metering abilities and several challenging

indoor shots to flex the flash.

Each scene was taken using full-auto mode, plus the mode best-suited to the scene – assuming the camera had one. We reviewed the results on the camera LCD before downloading to a PC and judging the picture onscreen, and printed to 6x4in on glossy paper. Using Adobe *Photoshop* we zoomed in to examine fine detail and determine how each camera's software coped with demanding line rendering and shading conditions.

The last step involved a trip to the local alehouse where the cosmetic charms of each camera were examined – and ridiculed – by patrons.

Photography Jesse Wild

Casio Exlim EX-Z60
£200
Manufacturer Casio **Web** www.casio.co.uk

92%

gold
PCFormat

While other cameras here boast twin lenses, weather-proofing, optical image stabilisation or the build-quality of a German supercar, the Casio is more of a Ford Mondeo. It's not terribly exciting, but it is a top seller, and with good reason – it offers great value and does what it sets out to do better than any other in its class.

The spec is nothing to write home about: a 6Mp CCD, 3x optical zoom, good battery life and 2.5 inch screen are fairly average. Even the anti-shake is poor relative to the Sony's, being a digital rather than mechanical process.

However, the EX-Z60 is the lightest camera here, and offers great high-speed focusing and shutter action. In the pub and it will look as good as the Sony – for a fraction of the price.

While the shot-preview on the Casio's screen is slightly soft, the actual pictures are pin-sharp. Colours are balanced and natural, contrast is finely crafted, without any artificial enhancement, and the metering didn't miss a beat in any of our imaging tests. Prints are smooth and the overall operation, from powering up to printing out, is sleek and efficient.

The Casio is a jack-of-all-trades, offering close to the best in performance, genuinely useful features, and style to boot. Not bad for the joint-lowest price in this test – buy one today!

Panasonic DMC-LZ3
£200
Manufacturer Panasonic **Web** www.panasonic.co.uk

87%

Although it's a bit portly when compared to the competition here. Thankfully, the Panasonic DMC-LZ3 is extremely comfortable to use.

Better still the bulky body houses the most powerful lens on test: a whopping 6x magnification, and Panasonic's superb Mega OIS image stabiliser ensures that big zoom doesn't mean big blur. The OIS is a genuine optical image stabiliser – as opposed to DSP processing – and allows you to take handheld shots down to 1/15th sec with no shake. At maximum zoom this is nearer 1/60th but ideal for action shots or occasions when you don't want to use the flash.

The DMC-LZ3 also uses Panasonic's latest Venus Engine Plus electronics, which reduce the time between pressing the shutter and taking a picture to almost nothing. Engaging the OIS slows this down, unfortunately, but you can't have your blur-free cake and eat it.

Out and about the Panasonic is fairly easy to use, but the small screen limits its appeal, and the bulk means that sticking it in your shirt pocket isn't an option.

The picture results are also first class, showing superbly crisp imaging with excellent contrast and detailing. Colour is very natural, although not as vivid as the Sony, the flash is the most powerful of this bunch and its metering handles tough scenes like our 'into the sun' test admirably.

Fabulous imaging and operation, an excellent lens, great OIS and plenty of useful features make the DMC-LZ3 a very strong performer. If only it wasn't such a bloater…

top gear PCFormat

Olympus Mju 700
£230
Manufacturer Olympus **Web** www.olympus.co.uk

74%

The Mju 700 offers a 7Mp CCD – that's a lot of pixels for a compact camera, and means your images can be blown up some 15-20% larger than 6Mp or 5Mp cameras. Unfortunately, it creates files the size of the Isle of Wight, and unless you plan to print poster-size images, you probably won't notice the difference anyway.

But the Mju 700 also features an innovative low-light mode called BrightCapture, and it claims to be weatherproof. It stood up to light drizzle during testing, but we stopped short of giving it a full dunk in a bucket of Tizer to emulate heavy conditions.

It's might uncomfortable in the hand, feels more like plastic than metal, but at least it slips neatly into your pocket. The controls are not the most straightforward on test, and choosing from the 23 scene modes might restrict its use as an action-shot camera.

The large display's image quality is also slightly below par compared to the Sony or Kodak models, although the images it produces bear close scrutiny. Colours are cool and natural; the 7Mp CCD is definitely advantageous if you frequently zoom and crop into your images, and contrast is generally good, but can overpower some images at times, with some dark and bright areas a little bleached out. The BrightCapture works well, albeit suffering a little motion blur if you're prone to hand-shake.

In solus, the Mju 700's high resolution and easily pocketable nature make it appealing, but it's outgunned by the classier cameras in this test.

Kodak EasyShare V570
£270
Manufacturer Kodak **Web** www.kodak.co.uk

83%

Sticking two lenses on a camera is not new – Rollei did it in the 1920s – but Kodak's twin lens V570 has a very special trick up its shutter. Its main lens is a standard zoom but you can swap to the second lens offering 38mm down to a near fish-eye wide-angle 23mm.

Both lenses are made by Schneider-Kreuznach, and Kodak's own Colour Science Chip is assures vibrant colours… it says here. What the manual neglects to mention is that the solid, stylish and contemporary design is brick-like, and those lenses cost big money.

Kodak virtually pioneered making digicams easy to use, and the V570's EasyShare system, simple docking cradle and one-touch transfer/print button is no exception. The Kodak is a joy to use, as long as you stick to the auto-modes, and the screen is bright and clear. It is swift to take a picture when you press the shutter, recycles quickly and the results are largely excellent. Colours are indeed bright and lifelike, the contrast is the most natural and detailed in our test and the image is super-sharp throughout. The V570 hiccupped by bleaching out the picture on our 'into the sun' test and can occasionally look a bit too light, but the wide-angle views, indoors and out, more than make up for that.

Simple to use, great pictures and twin lenses make the Kodak one of the most flexible all-round snappers available, albeit short on techno-kudos and style for the discerning camera geek.

top gear PCFormat

Sony DSC-T9
£330
Manufacturer Sony **Web** www.sony.co.uk

74%

The DSC-T9 feels like a finely crafted camera. It's all metal, seemingly engineered to last a lifetime, and from the slide-down lens cover to the clear LCD, it simply exudes class. Just as well because £330 demands some serious exuding.

The core specification's impressive, if not class-leading, with a 6MP CCD, a Zeiss 3x optical zoom lens and electronic image stabilising software under the guise of Sony Super SteadyShot. The T9 does nose ahead where onboard memory and battery life are concerned, as well as close-focus for macro shots down to just one centimetre. A high-sensitivity CCD allows shooting in very low light conditions, there's a 16:9 mode for playback on widescreen TVs, and slideshow with MP3 music feature, too.

The menus are very clear, the Clear Photo LCD is best in this test for clarity, and every function seems only a click or two away. Its focusing and snapping are faultless, the review is crystal clear and there's also a handful of useful scene modes.

Better still, image quality is jaw-dropping, and the colour balance is the most vibrant here, but when you consider that this camera is £130 more expensive than its nearest rival on this test, it should be. The menu system and preview quality aside, the DSC-T9 offers little to back up its inflated price point. Build quality is fantastic, admittedly, but near-identical shots can be obtained at a much more affordable price.

If we could own one of these cameras, it would be the Sony DSC-T9 – if it was more affordable. Questionable value for money means the DSC-9 can't win this test.

top gear PCFormat

Casio is king

Only one of our cameras clicks all the right boxes

Every one of our contenders can turn a partially sighted dachshund into David Bailey, but that doesn't mean that all digital cameras are the same, of course.

Despite its impressive 7Mp specification, the Olympus just goes to prove that the size or your CCD isn't everything. While its pictures are good, it feels light and plasticky, it's not intuitive and the LCD display is fuzzy compared to some of the displays here.

Sony's gorgeous DSC-T9 has got it all, but the OTT build quality and iPod-like kudos come at a price – and that price is £130 more than our test winner.

Kodak's V570 has no such trouble, being solid, simple to use and offering the widest wide angle lens of any digital camera on the market. We would thoroughly recommended it, but the Kodak slips into third place thanks to its clunky design.

Panasonic's DMC-LZ3 has the best single lens in this pack and genuine optical image stabiliser technology. Picture quality is great throughout but at near twice the size of it peers, you won't want to slip it into your pocket every day. As instant snaps are half the fun of digital cameras, the DMC-LZ3 is highly commendable, and gets second place.

Top dog, though, is Casio's Exlim EX-Z60. It's not exactly bursting with manually adjustable features, but it takes pictures of quality comparable to the Panasonic, is as easy to handle as the Kodak and is very close to the much more expensive Sony camera in terms of sheer style. For a great, affordable all-round digital camera, Casio's EX-Z60 is simply the best choice.

> "Casio's EX-Z60 is a great, affordable all-rounder"

Less is more
How many megapixels are enough?

Over the last few years, the cameras that have offered the highest resolution CCD for the smallest outlay have always been bestsellers. Today however, even affordable compact cameras are offering 6Mp as standard, and you may never need more.

A 6Mp image in 4:3 ratio comprises roughly 2,800x 2,100 pixels – and that really is high res. If you view the images on your PC (1,280x1,024), HDTV (1,280x720) or PMP (340x280) you won't even see half the full image resolution. Moreover, printing at most high-street photographic shops can run at just 100dpi without notable pixilation, giving you the ability to enlarge a 6Mp image to a whopping 28x21in poster.

A higher resolution CCD does theoretically offer you the option to zoom and crop the image on your PC while retaining a decent picture quality. In reality this only works for high-end SLR digital cameras. Using a relatively cheap compact camera with at least 6Mp resolution, macroscopic image detail is more a function of lens quality and aperture than pixel numbers.

Worse still, if a manufacturer spends more on buying in or developing a higher-than-average resolution CCD, they will probably have to compromise on build, specification or features elsewhere to cover the cost. Ergo, cheaper higher resolution cameras (7Mp or greater) are more likely to perform worse than similarly priced lower resolution (5 or 6Mp) models – as the results of this very test so clearly demonstrate.

Add to this slower camera recycling times, fewer images per memory card and the greater hard disc space used for higher resolution images, it is easy to see that, in megapixels at least, bigger is not necessarily better.

IN DETAIL The stats that matter in our digital camera test

	£200 **Panasonic Lumix DMC-LZ3**	£200 **Casio Exlim EX-Z60**	£230 **Olympus Mju 700**	£270 **Kodak EasyShare V570**	£330 **Sony Cyber-shot DSC-T9**
	87%	92%	79%	83%	74%
PIXELS	5Mp	6Mp	7Mp	5Mp	6Mp
SCREEN SIZE	1.5in	2.5in	2.5in	2.5in	2.5in
OPTICAL ZOOM	6x (7.5x Max)	3x	3x	5x (inc. dual lens)	3x
35MM EQUIVALENT	37-222mm	38-114mm	37-111mm	23-117mm	38-114mm
DIGITAL ZOOM	4x	4x	5x	4x	6x
BUILT-IN MEMORY FORMAT	14MB	8MB	19MB	32MB	58MB
REMOVEABLE MEDIA	SD	SD	XD	SD	MemoryStick
MOVIE CLIP	QuickTime	AVI, WAV	QuickTime	QuickTime	MPEG1
IMAGE STABILISIER	Mega OIS	Anti-Shake DSP	None	None	Super SteadyShot
BATTERY LIFE	250 images	180 images	180 images	150 images	240 images
SHUTTER SPEEDS	1/8-1/2000sec	1/2-1/2000sec	4-1/1000sec	8-1/1448sec	1/4-1/1000sec
APERTURE	F2.8-F9	F3.1-F4.4	F3.4-F5.7	F2.8-F4.4	F3.5-F4.3
DIMENSIONS	100x62x45mm	95x60x20mm	95x56x20mm	101x50x20mm	90x54x20mm
WEIGHT	183g	118g	140g	125g	134g

Pocket money pages

## SUB-£100 GOODIES FOR THE BARGAIN HUNTER

Enermax Aurora

A keyboard so heavy, you could brain a burglar with it

Price £57 **Manufacturer** Enermax **Web** www.enermax.com

Whatever happened to the old luxury keyboard? There's the odd Microsoft or Logitech option, but these tend to be pretty pricey and often no less plasticky than cheaper offerings we could mention. Your choices are limited, no two ways about it. It's hard to believe how little attention is actually paid to this most-used of peripherals.

Hurrah, then, for this skinny little offering from Enermax. Cast in brushed aluminium, it's weighty, robust and pleasingly cool to the touch. The slimline profile makes it closer in appearance to a laptop keyboard – it's dead thin, and quite stylish. However, it has none of the irksome springiness you get with many laptops; the keys are firm and highly responsive, which makes it great for FPS games as well as general typing. It also acts as a two-port USB hub, and can be connected to the mic and audio sockets of your rear panel, which then terminate in mic and line-out sockets on the side of the keyboard.

top gear PCFormat

86% **PCF says...** "Weighty and cool. A pleasing adornment for your desktop."

USB Mini-Vacuum

Price £8 **Manufacturer** Direct USB Store
Web www.directusbstore.co.uk

When we first turned on this whiny little sucker, the apparent lack of slurp when placed upon one's palm was a little alarming. Pitched against the dust-and-grease build-up of a journalist's heavily hammered keyboard – surely the Everest of desktop cleaning – the USB Mini-Vac proved its worth, though.

It may feel as gusty as a still summers' day, but turns out to be suckier than a horny teenager giving a lovebite. Three speed settings, an LED light for cleaning inside a case and two nozzle attachments add considerable 'makes a nice gift' appeal.

79% **PCF says...** "What do you buy the geek who has it all? This."

Vanguard external enclosure

Price £15 **Manufacturer** Enermax
Web www.enermax.co.uk

The small tin that forms this USB 2.0 enclosure so reminded us of a school pencil case that we scratched the following nostalgic ode into its surface:

There was a case called Vanguard,
It was shiny and cheap, but not that hard.
If you fill its inside
With an 80GB drive,
It's more cost effective than a similarly
specced pre-built option from Freecom.

The point about our awful poetic sensibilities is moot, but we hope you'll heed our advice and buy the Vanguard.

top gear PCFormat

88% **PCF says...** "For cheap, stylish storage, build your own drive."

ZBoard Merc

Price £30 **Manufacturer** Ideazon
Web www.zboard.com

Who buys these gaming keyboards? The new ZBoard Merc hopes to win approval with a combination of interesing ergonomic design, rather than pure WSAD mimicry, and there's also the coveted ZEngine software, which allows you to design preset key-templates. We've seen the next update for the ZEngine though, and it's more exciting than the one bundled as standard.

The most important difference is that it offers full macro control of every key, meaning you can assign a frantic combination of commands to the 'Panic' button and turn into a whirling, grenade lobbing dervish. We can't wait for that...

79% **PCF says...** "There's potential there, but wait for the update."

Yamamoto 1025 Deep Red

Price £16 **Manufacturer** Yamamoto Group **Web** www.yamamoto-group.co.uk

Yamamoto's USB phone may be the gentle nudge towards VoIP you need. Freeing you from the shackles of those desktop mics and headsets, the 1025 is a light, comfortable phone which appears on your system as a separate sound device – easy to set up in *Skype*, *MSN* or *AIM*. While there is a driver, which allows control of *Skype* from the phone itself, limited space on the display means you're likely to spend your time looking at your monitor anyway and the sound quality isn't up to the standard of other VoIP phones we've seen. Stick to a headset for now.

top gear PCFormat

84% **PCF says...** "Well priced, but surplus to requirements."
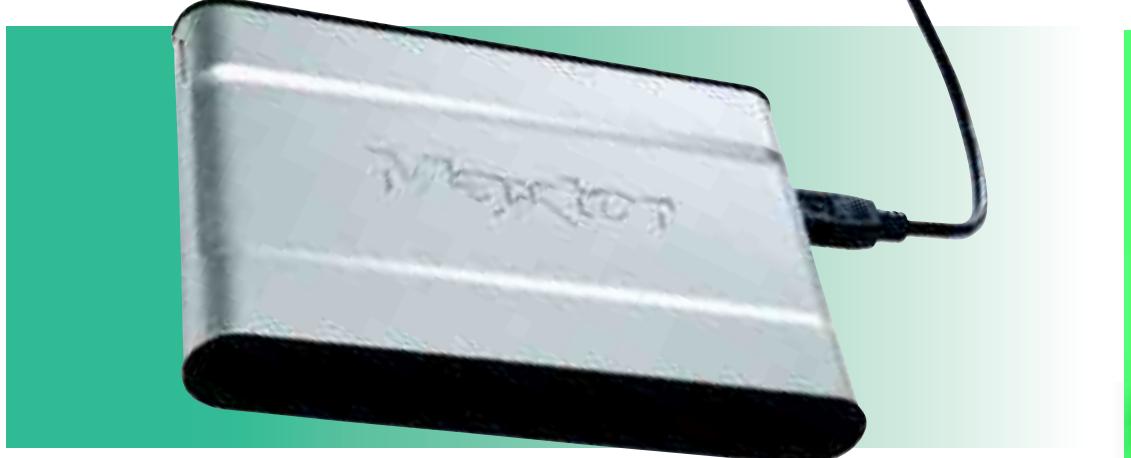
OneTouch III Mini Edition

Go on, touch it. You know you want to…

Price £106 **Manufacturer** Maxtor **Web** www.misco.co.uk

Although the retail price is close to £150, we found reputable etailers stocking this 100GB, 2.5-inch USB 2.0 drive for just over the hundred-clam mark *[Isn't this the Pocket Money Pages? – Ed]*. Now, we know that storage prices are dropping hugely at the moment, but a quid a gig is incredible considering 4GB USB drives are still hovering around £80.

The OneTouch III Mini is not only affordable though: the performance is also impressive. We put it up against an equivalent 5,400RPM drive with a USB 2.0 connection and in transfer tests it worked out at over 15% faster. It's also delightfully diminutive as well, taking up less space in the back pocket than a well-thumbed paperback (though it's less comfortable to sit on). The pre-installed backup software gives you a wealth of options allowing you to choose exactly what you want backed up on the OneTouch and when you want it to do it. As a portable, secure storage drive this offering is hard to beat.

gold PCFormat

92% **PCF says…** "A fast, responsive drive, and it's great value too."

Sony Vaio VN-CX1

Price £55 **Manufacturer** Sony
Web www.sonystyle.co.uk

Novelty. It's a wonderful thing. Take this USB optical mouse-cum-*Skype* phone; what a great idea! But given the fact that novelty wears off, there's a limit to how much we're prepared to pay for such items. That's why everyone coos over Sony's Aibo, but barely anyone bought one. The VN-CX1 is light, saves space and looks as stylish as the concept allows. But it's hewn from slightly flimsy plastic, has no display or buttons and will give your wallet a sound kicking. If you are a desperately fashion-conscious exec, this will make you the toast of the boardroom for a week, but where's that next meal coming from, eh?

52% **PCF says…** "It works, but it's an overpriced novelty really."

Sensible Soccer Plug 'n' Play

Price £25 **Manufacturer** Firebox
Web www.firebox.com

We couldn't help but notice that *Sensible Soccer* has not only been resurrected in 3D (p98), but also in a standalone form that plugs into your TV. Rather than risk our atrophied muscles by running around in the park, we settled in front of the gogglebox and enjoyed frantic matches between such fierce rivals as Pizza Toppings, Crimes United and Greek Gods. *Sensi* has lost none of its charm in 14 years, and it's perfect for holidays and house parties alike. Also included in the package are *Cannon Fodder* and *Megalomania* – both worthy games, but *Sensi* is undoubtedly the king.

top gear PCFormat

88% **PCF says…** "Party like it's 1992. *Sensi* beats *FIFA*, easily."

Sennheiser CX300

Price £30 **Manufacturer** Sennheiser
Web www.sennheiser.co.uk

There's no point spending £100 on a decent MP3 player and then diluting the sound quality with bog-standard earbuds. If you can stretch to another £30, try these brilliant alternatives from Teutonic audio titans Sennheiser, complete with cortex-pounding bass boost. The Sennys are great with any kind of music, managing to sound both crisp and rich; as mentioned, though, that bass boost makes listening to electronica, funk and reggae a particular pleasure. They're light and comfortable too, with adapters in three sizes – and the price is spot-on, to boot. These really are darling buds….

gold PCFormat

90% **PCF says…** "Comfy, and ace-sounding, with great bass."

Long term test

RATINGS BEYOND THE WARRANTY

Mustek DV3000

Lots of people don't understand the concept of these little 'toy' digital video cameras. Terrible quality photos, wobbly video and awful sound don't tend to inspire buyers, but for me, this was the perfect device to capture my daredevil snowboarding antics on a trip to Austria a couple of years ago. I wanted something that could record clips of us sailing through the air without shattering into a bajillion (yes, that many) pieces the first time it was landed on during a tumble.

My particular DV3000 wears the scars of battle with pride but despite the ravages of the piste, it continues to churn out web quality AVIs. The Mustek still gets some use – often when something amusing catches my eye, where people would whip out a camera phone, I reach for my toy cam. Best of all, with an old 256MB memory card you can record almost half an hour of video, and the battery life will accommodate.

Mustek has recently released a new toy cam, the DV5300SE, which arrives at around the same price point, 70 quid or so, but with significantly uprated video quality. With 1GB SD cards currently cheaper than a poke in the eye, you can have a pocket snappy cam, capable of a good couple of hours, for under £100. Pocket money price indeed.   **Mike Channell**

Tell us yours…
Send us a 200 word review of long treasured kit and if we print it, you'll receive a rugged, long lasting PNY Outddor Attache 512MB USB memory stick. Mail your reviews to **pcfmail@futurenet.co.uk.**

Ulead Video Studio 10 Plus

It's time to unleash your inner director and watch Hollywood bow to your genius

Price £51 **Publisher** Ulead **Web** www.ulead.co.uk

Feeling inspired by the season of rather limp summer blockbusters, we stepped blinking out of the cinema keen to improve on the work of the *Da Vinci*s et al.

Unfortunately our talent stretches to the point where we can drop clips into Windows *Movie Maker* and stick in an MP3 in as a backing track – hardly enough to earn us an Oscar. We need something that can handle heavy duty video editing, and remains easy enough for ham-fisted monkeys like us to understand.

Video Studio 10 Plus hopes to bridge the gap between *WMM* amateurs and professional celluloid wranglers with an affordable high definition (up to 1,440x1,080) video-editing suite. Best of all, Ulead certainly hasn't skimped on the features. For example, *Video Studio* has a remarkably straightforward Chroma key function, allowing you to perform in front of a blue screen (or green, or any colour) and paste yourself into imaginary climes. This *Plus* edition also includes a superb drag and drop 5.1 surround sound mixer – you literally place the audio track at a point in the field, or drag it around for sweeping, moving sounds. If DVD quality's good

enough for you, there's even a standard version of *Video Studio 10*, which lacks handy features but maintains most of the impressive stuff and shaves £20 off the price.

CLUTTERED STUDIO

Our only criticism is the layout – many of the features are hidden away behind poorly explained icons. For example, would you have guessed that the much-touted 5.1 mixer was hidden behind a non-descript button marked Audio View?

Considering the program demands the entirety of your screen, a little clarity would have gone a long way. Still, this is a flexible app, with plenty of different formats to export your projects to. It certainly rekindled some of the old movie-making passion we used to nurture and, if you want something beyond simple trimming and transitions, this comes highly recommended.   **Mike Channell**

Needs 1GHz CPU, 256MB RAM, 1GB hard disk space

Wants 2GHz CPU, 512MB RAM, 4GB hard disk space

81% **PCF says...** "Fairly cheap and feature-packed, but the interface is weak."

NetObjects Fusion 9

Want a website but don't want to learn HTML? Get a program to do it for you…

Price £71 **Publisher** Website Pros **Web** www.netobjects.com

The second dot.com boom is upon us: venture capitalists are circling, and it's once again cool to have a USB stick hanging from your neck. If you fancy the idea of retiring next year off the back of an internet IPO, listen carefully: you don't need to know how to write HTML to make a killer website. Instead, you can fork out the measly sum of £70 to buy *NetObjects Fusion,* which will generate all the code you need – complete with fancy layouts. Compared to the £400 that *Dreamweaver* will set you back, this is a remarkable bargain.

LOST IN THE WEB

Fusion takes a different tack to *Dreamweaver* by presupposing that you don't want to see any source code when making your site. The default workspace lets you click and drag items around a page, add new page elements such as pictures and forms, and preview the results in the built-in web browser. If you really want to see the generated HTML there's a special code editor that locks the automatically generated parts of the page to stop you accidentally deleting important things.

Fusion comes with over 60 predefined templates and colour

variations. These usually have one or two standard pictures to add some finesse to the design, but then use placeholder images where you can drop in your own content easily. If you don't have a good image editor installed, *Fusion* can help optimise pictures for minimum download size, tweak colours and contrast, flip, rotate and crop, and more. When you're finished with your site you can either upload it to your webspace, or you can sign up for an account with the creators of *NetObjects*.

We've used dozens of web development packages in the past, and are still amazed by the low learning curve offered by this release of *Fusion*. While it doesn't have all the fiddly options you'll find in *Dreamweaver,* it does have everything that home users want to make the site of their dreams. What's more, it does it at a fantastic price that ought to leave *Microsoft FrontPage* users feeling quite ripped off.   **Paul Hudson**

Needs: 600MHz CPU, 256MB RAM, 250MB hard disk space

Wants: 1GHz CPU, 256MB RAM, 250MB hard disk space

86% **PCF says...** "The wealth of features makes this unmissable and cheap."

"Few can deny Half-Life 2 Episode 1's flair, its style, its panache or its personality"

Anton nests in the city require a few new tactics.

Half-Life 2
Episode 1

Ah, Gordon Freeman. It's good to see you again…
PCFormat's favourite meal returns in tasty bite-size portions

Price $20 (around £12) **Publisher** Valve **Developer** Valve **Web** ep1.half-life2.com

The last two years didn't happen. You can pretend they did, but, let's be honest, nothing has changed between 2004 and 2006 at all, at all. *Quake IV*? A footnote of a footnote in PC gaming's history. *SiN: Emergence*? The first-person shooter equivalent of the Kaiser Chiefs: unashamedly derivative, and almost offensive to anyone with a working knowledge of what's gone before, but loved by thousands for its threadbare simplicity. *F.E.A.R.*? *B.O.R.I.N.G.*, more like.

It's like *Half-Life 2* never happened. Sure, there is some discomfort to be had from knowing that it was a product made by folk who were millionaires before they ever entered the gaming business, so it had an incredibly unfair advantage. But few can deny its polish,

BUY THIS IF YOU LIKE...
>> **Deus Ex**
   Eidos
>> **F.E.A.R.**
   Vivendi
>> **Beyond Good & Evil**
   Ubisoft

its panache, its personality, its depth – as much depth as a game about pretending you've got a gun can manage, at least – and, most of all, its sense of place. *HL2* shouldn't still be the very pinnacle of shooting games – by now, it should simply be the norm. But nothing, not a single pixel-shaded sausage, has even tried to encroach on its deeply satisfying territory. So, nearly two years on, the only game to meet its high standard is its own sequel-cum-expansion pack.

LIFE AS WE KNOW IT
And it's glorious. After such a fallow eighteen months for murder simulators (© Jack Thompson), *PCFormat* was beginning to wonder if perhaps it was out of touch. These young people and their violent videogames… all headshots and no trousers. But no – this is the once and future king, even though it really does do very little different from its predecessor. It's very literally the next episode, picking up from the exact moment the last one left off (almost), continuing the story while playing out like a sort of remixed greatest hits of *Half-Life 2*. There's very little that's new here – instead, you largely face familiar obstacles in circumstances modified just enough to ensure that the sense of threat is as great as ever.

Its cleverest trick is doing everything backwards. This starts where the last game ended and ends where it began, but entirely logically – you are, after all, fighting to escape, not to conquer, this time around. The first weapon you're

given (mere minutes in – after Alyx's survival of the mega-splode seen at *HL2*'s conclusion is explained in intriguing fashion) is the gravity gun. It was *HL2*'s ultra-weapon, but here its status as one of Freeman's core abilities is made very clear. It's a good 40 minutes before you gain any other firearm, so by then you're totally *au fait* with using the environment as both weapon and potential puzzle solution. It remained *PCF*'s most regularly used gun throughout *Episode 1*'s surprisingly lengthy duration – familiarity with this world makes grabbing a radiator or door and using it as temporary cover before flinging it into a looming Zombine's face far more like second nature than simply shooting it with a bullet. It's an incredibly organic thing – it feels so much better to make reflexive use of whatever's in front of you than simply parade around corner after corner with a loaded shotgun.

The rest of *HL2*'s inventory gradually snowballs into your hands throughout the course of the episode, culminating in the triumphant return of traditional starting weapon the crowbar, in a genuinely nostalgic and funny nod to past games. There are no new weapons or gadgets, but it's all cleverly cued up in such a way that there's a creeping sense that this is no longer an FPS first and foremost, instead more of a puzzle/adventure, some of whose circumstances just happen to require lots of gunplay.

FREEMAN'S BEST FRIEND
As with *PCFormat*'s original *Half-Life 2* review, it's difficult to convey the information you perhaps want to know about the game without spoiling it for you. Let's just say that, like one of the better episodes of *Lost*, it does a fine job of explaining some of its mysteries whilst simultaneously creating new ones. There's a sense of greater directness in its plot – certainly, the links between the first and second games are made very clear, as is much of the nature of the Combine – but some of this is because

"Muuuuuuuhhrr…"
Zombies: scary again at last

Episode 1 features several marvellous set-pieces that outdo its predecessor. A favourite is the stage where you're trapped in a power-cut building with just a failing flashlight and a pistol-toting lady for company, as the zombie hordes moan ominously from the blackness. It's your job to point the light where Alyx is shooting – trouble is, that battery won't last forever…

How did Alyx survive the explosion at the end of *HL2*? It's a core plot point for later episodes that we're not revealing...

All of *HL2*'s cast, including inexplicably affectionate robot Dog return, though Valve promises big-name casualties in later episodes.

you're no longer in an unfamiliar setting. You really do know this place now, and *Episode 1* is also good at making it clear that yes, you did save the world at the end of *Half-Life 2*. It's just that it needs a bit more TLC before it's ready to go to the toilet by itself again.

COMEDY SIDEKICK

There are some failings, depending somewhat on your point of view. Though Alyx is now a near-constant presence rather than an infuriatingly all-knowing teleporter, she remains almost invulnerable and with an infinite ammo pack. But the game is carefully hinged on your performance, not hers – it's rare

situations you find yourself in. Her presence is also a reminder of just how alone you were in *Half-Life 2* – taking down a gunship or a strider single-handed might not be new to Gordon, but it is to her, and she's duly impressed at your abilities. There's no longer a need to geekily punch the air whenever you do something badass – she basically does it for you.

Some may feel let down by the lack of newness, but this is after all an expansion pack and not a sequel. It's more *Half-Life 2*, with a few lessons learned and a superior flow as a result. When we're talking about the best singleplayer first-person shooter there

gold
PCFormat

With zombies and Antlions all over the city, you're not the Combine's only priority.

"The gravity gun's status as one of Gordon Freeman's principal tools is made very clear from the outset"

that she'll actually bail you out if you're flailing blindly around shooting at walls. Cock something up and unless you're able to pull off something pretty damn special yourself, it's quickload time. Her presence does, however, allow for larger-scale, more intense firefights – the well-known limitations of the Source engine mean it's still rare to see more than five or so foes onscreen at once, but, as in *Aliens*, this is disguised by always having a replacement for a fallen soldier bringing up the rear. Fearsome, lengthy waves of zombie hordes (which now look pleasingly diverse thanks to the hulking addition of becrabbed Combine to their ranks), which would have been infuriatingly unforgiving in *HL2*, now become heroic Alamo moments (but eminently survivable ones) thanks to your faithful sidekick's aid.

Alyx is also very likeable this time around – a healthy dose of impeccably written *Buffy*-esque dialogue lends genuine humour to proceedings, which helps to offset the nastiness of the

ever was, that's far from a crime. Play it with your brain switched off and you'll cruise through the whole shebang in something like four hours, but take your time over the game, soak up the world's look and feel, listen to the refreshingly sharp NPC dialogue, experiment with different ways of approaching each conflict and puzzle, and you'll drag it out to a deeply satisfying six or seven. In sharp contrast to last month's forgettable (not to mention decidedly regrettable) *SiN Episode 1*, the next instalment of this series simply can't come soon enough. **Alec Meer**

Needs 1.2 GHz CPU, 256MB RAM, DirectX 7 level 3D card

Wants 2.4 GHz CPU, 512MB RAM, DirectX 9 level 3D card

Net gaming Includes *Half-Life 2 Deathmatch* and *Half-Life Deathmatch: Source*

Discuss pcformat.co.uk/mag/hl2ep1

90% **PCF says...** "The return of the king – and this is one ruler we're happy not to overthrow."

Blowing off Steam
Clunky online registration? Hurrah!

While PCF didn't hit any problems with Ep1, those buying the boxed version still have to endure a torturous online unlock process, a nightmare if they're on dial-up, while many are seeing the game crash just after loading, apparently because a new system detection app is deciding some CPUs and drivers aren't up to scratch. Hopefully, it'll be fixed by the time you read this.

This really is too close. The Indian elephants can trample just about anything.

PCF's advice would be to give these men what they want, and get out of their way.

Following in the great man's footsteps is certainly a tall order.

A word to the wise: if your opponents has elephants, leave the pikemen at home.

high score *PCFormat*

CALL ME AL

Rome Total War
Alexander

A crusading conflict in the Middle East, led by someone who believes he's driven by God? It's all Greek to us...

Price $15 (about £10) **Publisher** Sega **Developer** The Creative Assembly **Web** www.totalwar.com

So all roads lead to *Alexander*, eh? At first, you'd think this was like *Viking Invasion*; after all, this is the Barbarians of the North sweeping down to assault the civilised states. Yet, there's a difference. In *BI*, you had a predominance of power and could live off pillaging the towns you assaulted; here you have a tiny but well-trained army taking on the might of the the Persian empire.

You need to conquer and hold 10 key cities across an enormous area within 100 turns (around 50 years).

BUY THIS IF YOU LIKE...

>> Alexander
Ubisoft
>> Alexander
The Heroes Hour
Deep Silver
>> Tin Soldiers
Alexander the Great
Matrix Games

That is, you need to conquer Asia before young Alexander pops his divine clogs.

From the off, Alexander needs to neutralise threats from the Lydians to the north and secure the Thracians' Byzantium, before moving into Persia proper. As his fleet is pitifully small, this must be done quickly (we waited too long and found ourselves washed up on the shores of Egypt). Once there, you're isolated and surrounded by huge Persian armies. You have to rely on funds from home, slavery and the plentiful but disloyal mercenaries to maintain your army's impetus. If you falter, your income will dry up, and you'll be wiped out. It's a great device and we welcome it.

BLESSED ALEXANDER

Beyond the overweening sense of historical importance, this expansion doesn't add much. Yes, there's the new Asian map to play on. However, there are only four new factions: the various barbarians, the Persians, the Indians with their elephants and naked female archers(!), and Alexander's own indomitable Macedonians. There's no new game mechanic, like *Barbarian Invasion* introduced, save for the new

ability to fight decidedly unbalanced multiplayer battles.

We'd love to have found out more about the cities we were attempting to conquer, seen a ghost overlay of the actual path of Alexander, year by year, so we could see how we compared (and inevitably how far we had fallen behind). And the Brian Blessed tones don't counteract the effect of the still-randomly Australian Romans popping up in the Help menu.

Creative Assembly has rested on its laurels; it should have followed Alexander's example and moved swiftly into unknown territory. Instead, it looks like we'll have to wait for *Medieval 2* for new challenges. A nice idea, but there's not enough expansion about this pack for our liking.   **Dan Griliopoulos**

Needs 1GHz CPU, 256MB RAM, 64MB 3D card

Wants 2GHz CPU, 512MB RAM, 128MB 3D card

Net gaming 1-8 multiplayer

Discuss pcformat.co.uk/mag/alexander

84% *PCF* **says...** "A good expansion that lacks a bit of depth. Better than the film, though."

Gordon's alive?
It's the people's Brian Blessed!

The historical battles have been handled very well. They are gradually unlocked as you work your way through the campaign. There are six missions here and happily, they're excellent and tough, with Brian Blessed's booming adding gravitas to the edutainment-tastic story.

Pic © Tony Larkin/Rex Features

The old "turn around with a plank and kill the other guy" routine never fails.

COLT SEAVERS SIM

The Movies
Stunts & Effects

high score PCFormat

Take your movies to the final frontier with fire, death and drama

Price £20 **Publisher** Lionhead Studios **Web** www.lionhead.com/se

Mr Molyneux's venture into the golden years of Hollywood was fun, but it was by no means comprehensive. The twin mechanics of studio management and cinematic creation offer tons of scope for expansion – and a high octane one

ON THE DVD
>> In-game footage
>> Screenshot gallery

BUY THIS
IF YOU LIKE...
>> **The Movies**
   Lionhead Studios
>> **The Sims 2**
   EA Games
>> **Coffee Break**
   Digital Jesters

to really spice your Movies up a bit. Some of the additions in *Stunts & Effects* deliver an engrossing movie-making experience, while others just increase the number of point and clicks you have to make.

MIGHT AS WELL JUMP
The new class of characters, the stuntmen, provide you with the stabbings and fires the original game lacked. You keep these chaps fit and healthy by throwing them into their training facility, or the hospital. The quality of your stunt work affects the stunts you can access and there are loads of extra sets and ornaments included too.
Overall, though, for the management section the stuntmen themselves are are a class too many to look after,

"Delivers an engrossing movie-making experience"

distracting attention from increasing your studio's prowess. When it comes to the Advanced Movie Maker, though, they shine. New scenes, camera controls, effects and costumes make a world of difference for the committed writer/director keen to create a classic. You can now spend hours, if not days, tweaking the weather effects, blue screen techniques and stunts on a shot-by-shot basis. Anything from miniature city sets to green screen aerial shots to explosions can be incorporated into your dream script.   **Tamsin Mackay**

Needs 2GHz CPU, 512MB RAM, 128MB 3D card

Wants 1GB RAM, Shader 3 3D card

Net gaming LAN, internet

86% **PCF says...** "An bridge too far for managers, but a wonderland of opportunity for film makers."

Even practising stuntmen can be horribly injured. In a humourous way, natch.

REALLY TIRED STRATEGY

Rush For Berlin

Fools Russian where Anglos should fear to tread

Price £35 **Publisher** Deepsilver **Web** www.rushforberlin.com

We're quite prepared to believe that the fraction of gamers who continue to purchase WW2 strategy have gone all the way through the saturation point and out the other side into some *2001*-style euphoria of crap Nazis goose-stepping a psychedelic cabaret along infinite rows

ON THE DVD
>> Playable demo
>> Screenshot gallery

BUY THIS
IF YOU LIKE...
>> **Blitzkrieg 2**
   CDV
>> **WW2 Frontline Command**
   Koch
>> **Call Of Duty 2**
   Activision

of Panzers, and as such there's a market for more of them. So in that spirit where does *Rush For Berlin* fit in?

GUNS, GUNS, GUNS
The basic premise is that time is precious. Your campaign is directly related to how quickly you complete missions. Take too long and the enemy end up with more and more powerful, technologically advanced equipment in later missions.

Rush is pretty enough, and there are deep and involving tactical dimensions to the game like maintaining lines of supply across a level. But the tactical approach is counter-intuitive. For example, you may think that setting up a sniper with a good vantage point might mean you can avoid getting your block of infantry torn to shreds? Think again. The *real* solution was to swamp that nest by charging loads of infantry straight at it. It gets worse, and these solutions have to

Rangefinding: inching your men forward, then running away as they're mown down.

be worked out by trial and error, reloading saves again and again.

There are bugs too, like units getting snagged on objects, or NPCs wandering off when you're not looking, which destroys realism, and we're sure hardcore WW2 enthusiasts won't like that. *Supreme Commander* is on the way, and we can't really expect another largely indistinguishable WW2 effort to stand out from the crowd. **James Carey**

Needs 2GHz CPU, 512MB RAM, 128MB 3D card

**Wants** 1GB RAM, Shader 3 3D card

Net gaming LAN, internet

62% **PCF says...** "Hard to get your head around, and not rewarding even if you stick with it."

Haha! Eat lead, theoretically invulnerable war machine!

The rooftop level is an imaginative arena, but it suffers from eye-watering textures.

Steer clear of the hobs unless you love the aroma of gently melting plastic.

Dave falls victim to The Channell Shove. Bet you wish you had insurance now, eh?
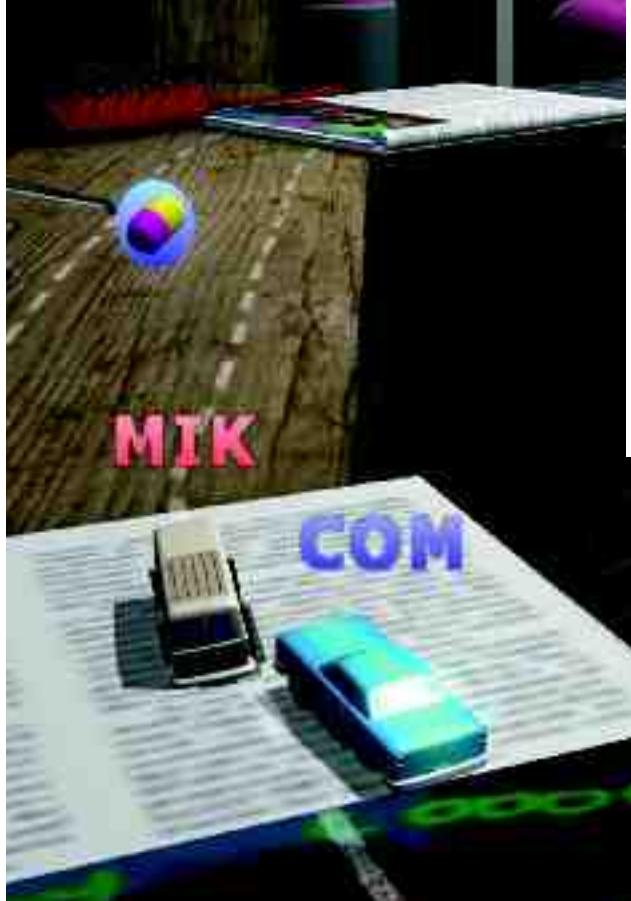
New locations include a hair salon, an office and, bizarrely, a butcher.

LITTLE FUN
Micro Machines V4

With the original a confirmed multiplayer classic, what could possibly go wrong, eh? Oh…

Price £20 **Publisher** Codemasters **Web** www.codemasters.co.uk

Nostalgia is a powerful thing. To pick one (entirely random) illustration, it's the reason why the primary drain of Alec's finances is his unchecked habit for buying old Transformers on eBay. It's also the reason why, when *Micro Machines V4* arrived at *PCF*, there was a swift gathering of damp-eyed journalists clutching USB joypads, keen to rekindle the joys of ruthlessly shunting their fellow scribblers off the edge of a kitchen table. But this is where nostalgia can also be a terrible thing.

Just as those *Teenage Mutant Ninja Turtle* comic books are not the great works of literature they once appeared to be, the *Micro Machines* concept has suffered the ravages of time in a more pronounced fashion than most.

It doesn't help that in this latest incarnation, any semblance of level design is lost in the mire of low resolution and dishwater dull textures. All the variety of tanks, boats and helicopters has been shunned in favour of largely indiscernible four-wheeled vehicles. The most heinous crime, however, is that it's just crushingly boring to play. The make-or-break multiplayer

mode suffers from fewer options than even *Micro Machines V3* had.

FOUR PLAY
Stalwarts like Party Play missed the cut, many of the more amusing power-ups have been replaced with generic guns and rockets and the tracks seem to flit carelessly between instant death-related frustration and mindless circulating boredom. We can't help but feel that the decidedly tepid gameplay would have warmed up considerably had there been eight cars on the track, all jostling for

Track ire 4
Little room for creativity

When we heard there was a track editor included, happy memories of MM2's intuitive tile-based track editing came flooding back. V4's effort is about as flexible as a girder. Placing waypoints in environs even more bland than those from the standard levels isn't fun.

position, but tradition has clearly been favoured over evolution.

The singleplayer mode is nothing short of excruciating. With the social element removed, it becomes a mind numbing and soulless slog. Faced with hauling ourselves through 76 challenges just to unlock tracks for multiplayer, we wept openly for deliverance.

We were genuinely hoping for a return to the whooping joy of instantly accessible four player action. What we were presented with was a dog-tired console port that suffers from severe idea anaemia. When one of the most thrilling multiplayer games of all time has been regurgitated as a washed out snooze-fest, it's difficult not to take it personally, and we are.   **Mike Channell**

Needs 800MHz CPU, 128MB RAM, 32MB 3D card

Wants 1.8GHz CPU, 512MB RAM, 128MB 3D card

Net gaming Four players over LAN or internet

Discuss pcformat.co.uk/mag/micromachines

52% **PCF says...** "All our fond memories shattered in a heartbreaking instant."

PCF loves *Sensi*'s Cup Creator. England versus Arsenal, anybody?

Calm, well-organised defending? Never! Break his legs!

CHIBI FOOTBALL

Sensible Soccer 2006

Proof positive, just in case you needed any, that it's not which Shader Model you use, but what you do with it that counts

This, apparently, is David Backham. It's a pastiche – go with it.

Price £17 **Publisher** Codemasters **Developer** In-house **Web** www.codemasters.com

When you think about it, 1992 was a really weird year. John Major was seen as the perfect man to lead the country; people bought 2Unlimited albums without being pilloried in the streets, and Gary Lineker was well known for being a good footballer. And, in bedrooms across the country, young boys who 'hadn't met the right girl yet' slaved over the blocky genius that was *Sensible Soccer*.

In its original form, this game was almost scarily rudimentary. *Sensible Soccer* presented Association Football

ON THE DVD
>> Playable demo
>> Screenshot gallery

BUY THIS IF YOU LIKE…
>> **FIFA 06** EA
>> **Pro Evolution Soccer 5** Konami
>> **FIFA World Cup Germany 2006** EA

Do I know you?
Player likenesses yes, player names, no

We all know what their names are, but for contractual reasons, players' genuine handles aren't allowed appear in the game. Thank Motty, then, for Sensi's Player Editor. Just a few minor alterations, and you can finally end all this Mickael Owan nonsense once and for all. Phew.

as seen through the steely, faintly psychotic gaze of HAL9000: all speed, angles, vertices and ridiculous parabolic banana shots wanged in from 400 yards out. It was a breath of fresh air.

"Association Football as seen through the eyes of HAL9000"

Keen (that is to say, older) readers may recall a 3D version of *Sensi* cropping up in the mid-Nineties, and *PCF*'s erstwhile game-anointers gave that short shrift, but this is almost as good as the original. It's *LEGO Star Wars*-charming: player animation is cute, and the close-ups of players' reactions and replays are all tastily cel-shaded. This, coupled with the sheer pass-punt-pass-shimmy-smack-GOAL!!! pace of the whole thing means that *Sensi* is still a hoot. There are loads of competitions to complete, and once you finished those provided, you can create your own leagues, too. Extra features, such as the

ludicrous banana ball, abound and beg to be unlocked.

WEAVE, DAMMIT
That said, tackling is hit-and-miss, and often sees your team buried under a landslide of yellow cards, The passing, while faster than a fat man falling out of a tree, can be wayward. Having *actually bettered* Maradona's weaving run on goal against England in '86, you can mysteriously shank the ball off at a right-angle two yards out, in an expletive-strewn bid for Miss of the Century.

Technically, it's the equivalent of a Model T Ford, but *Sensi* is also joyous, and shows that you don't need anisotropically filtered boxes in corridors to have an absolute ball. **Alex Jones**

Needs 1.6GHz CPU, 256MB RAM, 64MB 3D card

Wants 2GHz CPU, 512MB RAM, 128MB 3D card

Net gaming None

Discuss pcformat.co.uk/mag/sensi2006

78% **PCF says…** "A fast, furious, trip down memory lane – but PC geeks won't be pleased."
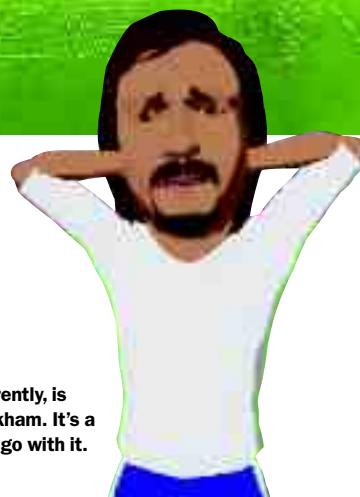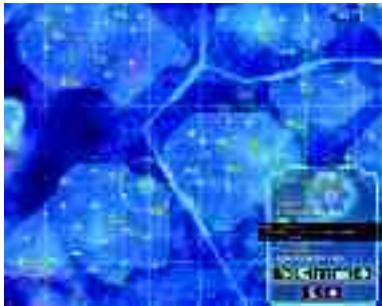
This is what the inside of a trade station looks like. Blue, isn't it?

It's as if millions of shoot-'em-up fans cried out in terror, and were suddenly silent.

Deepest space: kind of like normal space, only greener.

COMBAT EVOLVED
DarkStar One

Explore, exploit, expand and exterminate; but expect no excitement along the way

Price £25 **Publisher** CDV **Developer** Ascaron Entertainment **Web** darkstarone.ascaron.com

Space doesn't have feet, but if it did, *DarkStar One* would get off on the right one. The voiceover is as enthusiastic as a double bill of *Blue Peter* as the protagonist's ship, DARKSTAR ONE arrives at the station. You're as excited as he is at the prospect of carving a name for himself in this galaxy with his new ship. Sadly though, you're in for a very gradual let down. As the title suggests, you're stuck with the DarkStar throughout. This is no bad thing, though, as it is manufactured using mysterious lost technology and, in

"The galaxy has many systems, but they're all the same"

a deviation from the norm, you can level up the ship's hull, wings or engine when you collect enough artifacts from the inside of asteroids.

Things remain promising for the first couple of hours as you make some money blowing up dastardly space pirates, trading or smuggling goods,

engaging in a touch of piracy yourself or taking on missions. Sometimes you'll get asked to do something really crazy like blow up a satellite (probably a dastardly one), smuggle something or escort another ship. There's no variety and that's the main problem here.

SUSPENDED ANIMATION
Once you've done a fistful of missions you've done them all. The galaxy might be huge and have dozens of star systems spread over six regions of space but they are all the same, the only

BUY THIS IF YOU LIKE...

>> **X3: Reunion**
   Enlight Software
>> **Freelancer**
   Microsoft
>> **Eve Online**
   CCP

Hot plasma action
The intergalactic weapon of choice

Your super-nifty plasma gun can fire EMP blasts, trap enemy ships in stasis, make you invulnerable and much more. Plus, you end up really looking forward to upgrading it when you level up. Empowerment is always fun, and the possibility of further destruction is always hugely entertaining.

differences being models and textures and alien race names.

New equipment and random events are infrequent and the main story arc, while epic and speckled with cutscenes, has you transporting, killing and travelling, and *nothing else*. Precious artifacts are all gathered in exactly the same way. (and there are over 100 of them to track down, too). Anyone who this doesn't fill with despair at this prospect is clearly made of stronger stuff than us.

The only way you're going to get the change you desperately desire about six hours in, is through quitting and playing another game. It's time to fire up your warp drive and get the green space out of here. **Quintin Smith**

Needs 1.6GHz CPU, 512MB RAM, 128MB 3D card

Wants 2.2GHz CPU, 1GB RAM, 256MB 3D card

Net gaming None

Discuss pcformat.co.uk/mag/darkstar

60% **PCF says...** "Hour after hour of repetitive gameplay. In space, no-one can hear you snore."

SIMULATUS CITIUS

Glory of the Roman Empire

If this is the glory, we'd hate to see the decline and fall

Price £30 **Publisher** Ascaron Entertainment **Web** www.glory-of-rome.com

Strap yourself in, you've just been promoted. *Glory of the Roman Empire* puts you in the sandals of a latin city boss, narrowly beating *CivCity* and *Caesar IV* to the shelves. It's your job to manage slaves and natural resources, order the building of structures and generally keep the proles happy. It's a pretty game, and not

BUY THIS IF YOU LIKE...

>> **Age of Empires II**
Microsoft
>> **Rome: Total War**
Activision
>> **Civilization IV**
Firaxis

Once you've built what you need it's time to look at expansion.

too demanding on your hardware, though we're a little bored with the same water 'shimmer' effects appearing in game after game. This criticism is a clue to *GORE*'s ultimate flaw.

A helpful tutorial guides you through the basics, though veterans will be perfectly comfortable without it. Within the tutorial you learn that the basics all centre around keeping your citizens happy, and that the Senate is keeping an eye on you from afar, often interjecting to pass judgement on your leadership, whether you take on the missions or play in the meandering non-linear mode.

ROAMIN' EMPIRE

There are few surprises – gather stone, wood, clay; set up food production – and the game helps you along. Progress is slow, though, even with the magic speed-up-time button. We're not talking about progression through the ages, we're talking about building an amphitheatre and generously appointed bath houses.

Where your wealthy elite go to bathe, make deals and generally be annoying.

We'd certainly prefer it if the game moved at a quicker pace, because the interaction with your settlers (sorry, citizens) is a great deal of fun, especially when they get rebellious over your lack of vineyards.

As your town grows, so the prestige of the habitable buildings increases. That means you end up with snooty citizens who demand nearby entertainment. Best to keep these over-privileged namby-pambies away from your borders. They won't be much help when the barbarians come a-knocking – an inevitability as your town expands.   **Andrew Sutcliffe**

Needs 1.5GHz CPU, 256MB RAM, 64MB 3D card

Wants 2GHz CPU, 512MB RAM, 128MB 3D card

Net gaming None

68% **PCF says...** "Slow progress and lack of originality detract from a fun if bland title."

SIDEWAYS ACTION

Outrun 2006
Coast 2 Coast

The fast and the cheerful

Price £25 **Publisher** Sega **Web** www.outrun2006.com

How do you know when it's true love? Is it that first lingering glance across a smoky bar? Or is it the first time your lovely girlfriend encourages you to pitch your half a million pound Italian supercar into the

BUY THIS IF YOU LIKE...

>> **Need For Speed Underground**
EA
>> **Midtown Madness 2**
Microsoft
>> **Colin Mcrae Rally**
Codemasters

The delicious 360 Spider blasts past the remarkably pretty scenery.

high score PCFormat

most egregious 200mph powerslide possible? Claims of superficiality be damned, if it's the latter then she's definitely a keeper.

High-speed posing to impress the world's worst (or best) back seat driver is the premise behind *Outrun 2006 Coast 2 Coast*'s 'Heart Attack' mode. Your blonde companion calls out commands that range from simply passing traffic to avoiding UFOs, and you must diligently oblige. Luckily, thanks to inch-perfect arcade handling, you'll have few complaints.

CRAZY HORSES

For the traditionalists, *Coast 2 Coast* is stacked with other challenges, including standard race, time attack modes and the satisfyingly varied Flag Man challenges. You can even play the original version of *Outrun 2 SP* in its unfettered form. It's been a long time

If women were impressed by deadly driving, *PCF*'s flat would be the *Playboy* condo.

since we saw a really meaty arcade racing game on the PC.

While there's nothing like the longevity of *GT Legends*, it's great to see something that provides a focused blast of arcade joy, but retains enough depth (thanks to a whole host of unlockables and six player online mode) to keep you turning that ignition key beyond the honeymoon period.   **Mike Channell**

Needs 1.4GHz CPU, 256MB RAM, 128MB 3D card

Wants 2GHz CPU, 512MB RAM, 256MB 3D card

Net gaming Up to six players via LAN/net

86% **PCF says...** ""£25 for a garage full of Ferraris sounds like a good deal to us."

Zooming down to building level shows you exactly what your mini-citizens are up to.

Green regions show you how far your buildings reach.

LAUGH-A-MINUTE STRATEGY

CivCity
Rome

Hippodromes and circuses are the order of the day here, but the emphasis is on bread production. Hurrah!

Price £35 **Publisher** 2K Games **Web** www.2kgames.com/civcityrome/

Most buildings are available from the off – it helps to play the tutorial before you start.

That sound you can hear is fingertips rapping against tables. It's the sound you get when *PCF* looks at a game, not entirely sure where to go. *CivCity* is competent. It's detailed. It's balanced. But it's missing that… spark. It doesn't excite. There's something empty about it all.

Rewind. The big name in Roman city-building is *Caesar* – a fourth instalment is on its way soon – and if you've played that, you'll have a fair idea of how *CivCity* plays out. Some of the same names are on both credits screens. And in most technical levels, *CivCity* is the stronger game. The old 'walkers' concept is gone, leaving buildings that show you exactly which parts of your city are being served, while the concept of individual people living in your city has been heavily enhanced. You can follow them around, see how much spare time everyone has, even take the lids off buildings for a peek inside.

And in many ways, on a small scale, things are fine. You have all the components of a virtual Roman town to call upon… and that's the problem. Even when you're scrolling around from farms to temples to patrician districts to the Circus Maximus itself, it's not so much *CivCity: Rome* as *CivCity: Roman*.

REST ON YOUR LAURELS

After the *Caesar* games, it's largely an evolution; fixing problems here, polishing off rough edges there. Coming to it fresh, while you won't be bouncing out of your chair with excitement, it's a satisfying enough game.

Micromanagement is key, with the game expecting you to juggle everything from farming to housing to bloodsports – the wrath of the Gods being nothing

BUY THIS IF YOU LIKE...

>> **Caesar III**
Vivendi
>> **Glory of the Roman Empire**
Enlight Software
>> **Civilisation IV**
2K Games

Edutainment is fun!
No really – it's quite good

The CivCity Civilopedia (say that 10 times fast…) is a veritable reference book on Roman culture, taking you from the baths, to the different types of gladiator in the arena. Mostly there for interest rather than essential to playing the game, it's a good cultural primer, if nothing else.

compared to that of the debt collectors. Combat is an afterthought, and while there are missions (and a campaign) that go beyond 'build a really big city', the economic model takes centre stage.

On a wider level, there's a campaign mode that teaches you the game, before handing you over to your choice of single missions – from open sandbox building in Londinium to slightly tenser construction in Carthage, as well as a few global choices.

CivCity is a decent game. If the subject matter grips you, or you're coming to it from *Civilization*, it's compelling and well designed. Exciting it isn't, and in the end, the glory of Rome demands a level of oomph that it just can't quite muster.   **Richard Cobbett**

Needs 1.6GHz CPU, 512MB RAM, 64MB 3D card

Wants 2GHz, 512MB RAM, 128MB 3D card

Net gaming None

Discuss pcformat.co.uk/mag/civcityrome

76% **PCF says...** "Supplants Caesar, but doesn't bury him. One for hardcore history fans."

Not even waxing will help the spider ladies get those summer legs.

Who shot the sheriff? It wasn't me…

When cooking al fresco, always check the wind direction before reaching for the firelighters.

BIG ADVENTURING

Titan Quest

It's a clash of the titans as this Greek-themed action-RPG goes after a legendary Blizzard game's crown…

Price £35 **Publisher** THQ **Developer** Iron Lore Entertainment **Web** www.titanquestgame.com

Oh dear. Look behind you. Seriously, slowly. *Slowly*. You don't want to spook it. Why yes – it's an elephant, which has somehow got in the room with you. Hard not to notice it now, isn't it? Sidle up. See if it's got a name-tag or something and… oh, it has? Excellent. What's it called? Ah – yes. The elephant in the room right now is called "*Diablo II*", apparently.

Titan Quest is a little *Diablo II* in the same way that an orange is exactly like another orange. OK, that's a trifle unfair, but only one of those tiny trifles in a plastic cup which you get for terribly inflated prices at the local corner-shop.

For example, clearly in terms of aesthetics, there's a world of difference between the simple sprites of *Diablo II* and the sumptuous, impressively solid landscapes which you explore in *Titan Quest*. However, equally as clearly, there's a world of difference between the year 2000 and the year 2006. *Titan Quest* looks – ooh – about six years different from *Diablo II*. If it can be borrowed, Iron Lore Entertainment has borrowed it.

And, after some consideration, this is acceptable. While we'd wish some areas were pushed harder, the PC is in desperate need of a well-polished *Diablo*-clone for the modern audience. The closest thing are the *Dungeon Siege* games which, despite detractors, are actually considerably separated from their inspirations. Where *Dungeon Siege* was about leading a party, *Titan Quest* is about playing a solitary hero (with possible multi-player chums), going into dungeons, killing people, getting more powerful to kill even more powerful people and so on. A simple left-click interacts with everything. Left-click on a monster to attack it. Left-click on treasure to pick it up. Left-click on the right mouse button to get all confused. While there's shortcut keys, this makes the game terribly accessible.

Within seconds you're in and killing, and the basic compulsiveness of the design means that it's (er) deeply compulsive. More modern elements are welcome. For example, like *Dungeon Siege*, it uses streaming technology to connect all the maps together, meaning your adventures roll in atmosphere. Its good looks have been mentioned, but should really be stressed. There's a sense of coherence which is often lacking, with art and design being carefully considered

ON THE DVD
>> In-game footage
>> Screenshot gallery

BUY THIS IF YOU LIKE…
>> **Diablo II**
   Vivendi
>> **Dungeon Siege II**
   Microsoft
>> **Guild Wars**
   NCSoft

Wordsmith alert
Noted movie scribe pens adventure game

This isn't Baldur's Gate or Deus Ex in terms of plot, but the story, from Braveheart screenwriter Randall Wallace, is a cut above most games of this type. A game of this type often lacks an emotional punch, but thanks Wallace, that's not true of Titan Quest. If only more games were like this.

The chaingunners are the game's toughest bads, and attack in laughable numbers.

Nowadays it's far easier to have a pet fiery creature than it used to be...

The environments, while pretty, won't be giving *Oblivion* sleepless nights.

The ever popular Bring-Your-Own-Adventurer annual barbeque got a little out of hand this year.

"The visceral kick of seeing a mob of skeletons tumbling through the air remains"

whether you're in Greece, Egypt or Ancient Babylon. An especially modern touch is its use of rag-dolls, beautifully implemented, with mobs of opponents being sent hurtling through the air by the heavier attacks before collapsing with real solidity. Even after hours of play, the visceral kick of seeing a mob of Jason-and-the-Argonauts-esque skeletons tumbling through the air remains.

Its biggest addition to the formula is how it chooses to deal with characters. While increasing a level allows you to choose skills from a tree in the manner of (sigh) *Diablo II*, you're not actually pushed into rigidly defined character classes. There's six trees – from group-damaging Earth spell casters to traditional arms fighters to rogues and so on – and, as you progress through the game, you get to choose any two.

The best modern parallel is *Guild Wars*, and in Arenanet's game, this means there's a huge range of possible tactics available. People were replaying The Game That Has Been Mentioned Enough Already forever with far more structured classes, and this increased flexibility bodes well for repeated exploration of *Titan Quest*. This does

lead to the first major problem with the game. Hacking and a-slashing through the first third of the game, our brave little fire-ball lobbing Grecian lady only died twice. And both of them were in the final section, once when our attention drifted (and after ten hours with no deaths, it does tend to) and the other at the final big-boss.

There's higher difficulty levels, but they only unlock upon completing the campaign. For a lengthy game, that's profoundly repetitive the more experienced player is going to be risking boredom before he gets a chance to play something suited to their metal.

The other major problems are simply that it doesn't fix issues with the game it's taking from. For example, while it expands as the game progresses, your

Hit or myth?
Titan Quest dives into ancient mythology

The Minotaur is a bruiser, and if you know your Helenic history you'll be expecting one when you find yourself in a Labyrinth under Crete. Real Minotaurs don't exist. You'll also discover the Cyclops and the Gorgons just for that extra challenging fun that you wanted on a quiet Sunday Odyssey.

inventory space for magical sparkly things is strictly limited. Holding down [ALT] will reveal all the possibly interesting items on the floor, but you're going to have to actually pick them up to try and work out if you actually want something, and shuffle spaces in your inventory to make room for them.

Inventory management is, apparently, one of the hardest things to program in any game of this type. That's not much of an excuse, though, when you think about it. Try harder, as compulsively moving items around a grid isn't exactly what we became heroes for. See also some problems with the stationary camera obscuring, despite transparency and some bad collision detection on some of the projectiles.

But despite this, *Titan Quest* remains the most successful *Diablo* clone of recent years. While it's a little dispiriting that the game had no higher ambition than sitting in the throne while Blizzard's king is engaged on important business elsewhere, it's still a highly capable custodian of the genre.   **Kieron Gillen**

high score
PCFormat

Needs 1.8GHz CPU, 512MB RAM, 128MB 3D card, 5GB hard drive space

Wants 3GHz CPU, 1GB RAM, 256MB 3D card

Net gaming Up to six players via internet or LAN

Discuss pcformat.co.uk/mag/titanquest

81% **PCF says...** "A beautiful ancient-myth-set *Diablo* clone with nothing to be ashamed of."

Coffee Break

And not a Gervais to be found...

Price £15 **Publisher** Digital Jesters **Web** www.digitaljesters.com

We take our reviewing very seriously here at *PCF*, which is why we went totally method on this one, chugging cups of acrid sludge from the office coffee trough and spending an hour in the toilet cubicle reading the tabloids.

Coffee Break is a mildly charming take on the Sims-go-to-work concept, with the added bonus of bizarre translations,

swearing and a faint whiff of misogyny. Your task is to juggle office politics while still finding time to scrape enough work together to avoid getting fired, or at the very least fob your stuff off (sorry... delegate) on others.

There's enough here to amuse, and, despite some language mangling, the characters have the odd chuckle-worthy line. At £15 it's probably a nice alternative to another *Sims* expansion pack, but be warned, this isn't one for the kids.

No 'Photocopy bum' command here.

Needs 1GHz CPU, 512MB RAM, 64MB 3D card

Wants 1.5GHz CPU, 1GB RAM, 128MB 3D card

Net gaming None

70% **PCF says...** "Glib, foul-mouthed work avoidance? YES!"

International Cricket Captain 2006

Gotta love the thwack of leather on willow

Price £20 **Publisher** Xplosiv **Web** www.xplosiv.net

First things first, this isn't for the fair-weather fans the sport accumulated during the Ashes. It's an in-depth look at the tactics and tournaments of the first class cricket season. Reams of utterly inpenetrable jargon regularly tumble forth from cricket commentators. But invest a little time and effort into the game, and

you'll get a lot of enjoyment out of it. Practically all the intricacies of cricket are represented, allowing you to fastidiously alter your tactics and delivery ball-by-ball should you so wish.

If you have any inclination towards the in-depth tactical side of the game then don't be put off by the hideous 2D sprites of the match animations, get stuck in and lo, you shall be duly rewarded.

OK, so it's not the 'beautiful game'.

Needs 200MHz CPU, 32MB RAM, 4MB graphics card.

Wants 500MHz CPU, 64MB RAM, 8MB graphics card.

Net gaming One-on-one internet play

73% **PCF says...** "It's ugly, it's slow, but hey, that's cricket for ya."

Also out
By Dave James GAMING ROUND-UP

Marcus Trescothick's Cricket Coach
Price £10 **Publisher** Focus Multimedia **Web** www.cricketcoachgame.com

This spreadsheet-tastic experience, reminiscent of early *Championship Manager* games, has little to no tactical decision making, outside of replacing players and selecting aggression levels. It is only a tenner, but save up your pocket money and go for *International Cricket Captain* (left) instead.

Needs 800MHz CPU, 256MB RAM, 32MB 3D card

Wants 1GHz CPU, 512MB RAM, 128MB 3D card

Net gaming None

55% **PCF says...** "Frighteningly dull for anyone but the fanatics."

Eets
Price $23 **Publisher** Klei Entertainment **Web** www.eetsgame.com

Your simple protagonist, Eets – who looks disturbingly like psychotic adventure hero Max – is charged with reclaiming lost puzzle pieces.

Your aim is to drop objects into the game world to interact with Eets, each affecting him in different ways. You set the screen up then send him off on his way. It's beautifully drawn and utterly charming, and there's even an option to create your own puzzles.

Needs 750MHz CPU, 256MB RAM, 16MB 3D card

Wants 1GHz CPU, 512MB RAM, 32MB 3D card

Net gaming None

80% **PCF says...** "Cute, weird and very addictive."

Zen Bondage
Price Free **Publisher** Moppi Productions **Web** www.moppiproductions.net

Original ideas are few and far between so when you come across one like this you have to take knot... sorry, note. This is about wrapping up blocks of oddly-shaped wood in rope.

The great thing about this game is that you set your own challenges. Each block gets stained a colour as you wrap it, the aim being to get 100% coverage but you're alway given plenty of rope to complete the task. Thus, the challenge is only ever with yourself... ommmmm.

Needs 800MHz CPU, 256MB RAM, 16MB graphics card

Wants 32MB graphics card

Net gaming None

80% **PCF says...** "Strangely soothing and relaxing."
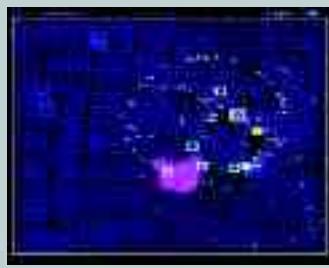
GLobotWars
Price Free **Publisher** Clasoft **Web** www.scene.org

As derivative as derivative can be but an awful lot of fun nonetheless, this is a shameless clone of *Gridwars* which was in turn a shameless clone of *Line Wars* on Xbox 360 which was a clone of... well, you get the idea.

Move in one direction, shoot simultaniously in the other. There are lots of them, only one of you, it looks like you've fallen through the maths and landed in a vat of vertex soup and it's as frantic as man covered in jam in a room full of bees. Simply lovely.

Needs 800MHz CPU, 256MB RAM, 16MB graphics card

Wants 32MB graphics card

Net gaming None

70% **PCF says...** "Free, limited in scope but glorious anyway."

Secret life
of motherboards

We're constantly told how much better one chipset is over another, but what really separates the great from the good, and is an enthusiast motherboard the perfect upgrade? Alan Dexter discovers all

Your motherboard is probably something you don't give a second thought to. It's the thing you plug your exciting kit into, but don't pay much attention to in itself. The arcane arts of volt-modding and overclocking FSBs are best left to the select few. You probably think, what does my motherboard possibly have to teach me? There is however a lot more to your motherboard than a collection of slots and connectors, and understanding how it all fits together

will both give you a better insight into buying a new one, as well as revealing how to get the most from the one you've already got.

Only a couple of years ago, the choice of motherboard chipsets was vast – SiS, VIA, Intel, AMD, NVIDIA and ATI all offered different north and south bridges for a variety of markets and price points. This may have been a little confusing for end users, but it did mean there were a wealth of options for manufacturers. It also made our job a lot easier as there were clear differences between the top of the range motherboards from Intel and the limited options from SiS or VIA.

MEMORY MATTERS
This market has been decimated by the manufacturers that made their money making graphics processors. NVIDIA in particular has the AMD market mostly sewn up, ranging from its latest and greatest NFORCE5 SLI chipset for AM2

processors through to it's cheapest NFORCE4 chipset that can be found powering PCs for around £50. NVIDIA offers the same NFORCE chipsets for Intel processors as well, although the lucrative enthusiast market has shunned this platform, as until now AMD simply produced the best processor out there. Things are about to get a little more

muddied here though, so what is important in choosing a motherboard?

The crucial area of memory throughput has traditionally been one that has separated the men from the boys, but this changed significantly when AMD integrated its memory controller onto the CPU. While there is still some differences

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Jargon Buster
Front Side Bus

The FSB, or Front Side Bus to expand the acronym, defines the speed at which the processor bus operates – generally the faster the better, as it means more data can be passed to the CPU. The processor frequency is derived by multiplying the FSB by the processor multiplier to give you the final speed.

</div>

You don't have to spend big to land a good motherboard.

Too much of a scaredy cat to overclock manually? Let the board do it for you…

to be made with the layout of the tracks on the motherboards, the difference this actually makes is so slight as to be almost meaningless.

One of the more novel additions to NVIDIA's NFORCE5 series of motherboard chipsets is its Enhanced Performance Profile (EPP). This is a much needed extension for the Special Presence Deficit (SPD) chip that can be found on memory sticks. The SPD currently defines the CAS Latency of the memory stick at specific frequencies, so it may dictate that the memory has a CL of 3 for DDR400 operation, 2.5 for DDR333 and 2 for DDR266.

All well and good, but the SPD errs frustratingly on the side of caution with respect to actual

fits within the normal 128 byte area. It includes details of the standard frequencies and latencies as well as advanced options, such as high frequency settings and voltages – which may be needed to run the memory at its highest setting.

If you're not interested in running memory at faster speeds, or your memory doesn't included the extra EPP information then you can turn EPP support off in the BIOS – currently only Corsair offers EPP memory, but everyone else is expected to follow. Also, those looking for breakneck performance can still opt to set the voltage, frequency and latencies in the BIOS manually. Even so, as a middle ground for anyone that wants better

"Recent developments have seen dedicated overclocking chips integrated into motherboards"

performance. The idea being that those that want to run their memory faster than the specification can do so in the BIOS. The problem is, the SPD sticks too rigidly to the JEDEC specifications – so you won't for instance find any timing details for memory that can run faster than DDR400, regardless of how fast the memory can actually operate. This is the reason that if you your super-swanky new DDR533 memory in your system and expect a massive performance boost, you'll undoubtedly be disappointed.

Unless that is you are used to rolling your virtual sleeves up and get your hands dirty setting original timings in the BIOS (digital Swarfega is an extra). EPP is a long overdue fix to this frustrating situation. EPP extends the usefulness of the SPD, yet still

performance but can't be bothered with performing hit-and-miss BIOS tweaks, it's a neat, and ultimately much overdue, enhancement

TWEAK CITY
Really, though, there's little to separate motherboard chipsets, which has pushed the emphasis onto the actual motherboard manufacturers. Specifically, this has created a gap in the enthusiast market that has lead to the likes of Asus, MSI and Gigabyte creating ever more cunning tools to overclock their motherboards. This is achieved by a series of hardcore voltage tweaking BIOS hacks and garishly designed Windows interfaces.

Such tweaking has been available on high-end motherboards for years, but more recent advances have seen dedicated chips integrated into motherboards to

FSB or HT?
Should all machines use HyperTransport, or is Intel's more traditional FSB approach better?

Data buses are crucial to the performance of the PCs and the components that communicate through them. So why are there two competing technologies? Well it all comes down to vision versus legacy – while Intel has developed what it has known best, AMD rewrote the book so that it can make a difference in the server market.

When AMD was developing its next-gen processor, what we now know as the Athlon 64 and Opteron, it had multiple-core CPUs in its eyes. In order for those cores to communicate with each other, and the other components of the system, AMD decided that it needed a single high-speed bus that could cover both tasks. HyperTransport is the answer, and this versatile high-speed speed bus remains a firm favourite at PCF.

HT allows far more efficient communication than FSB.
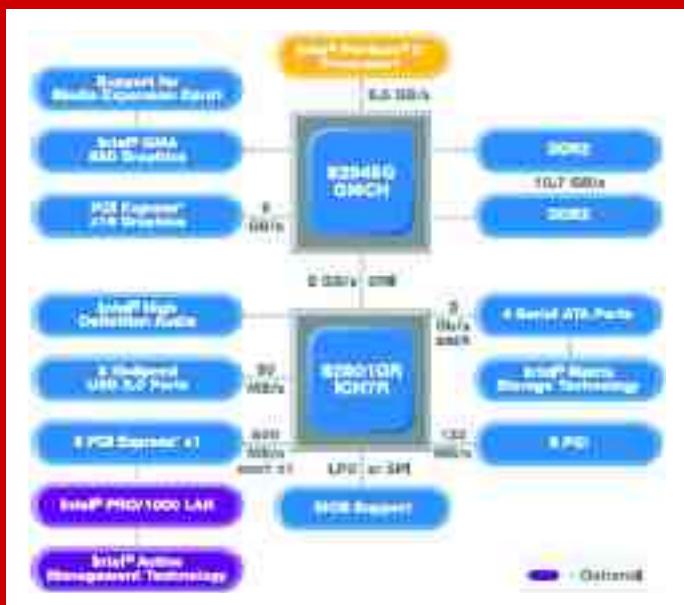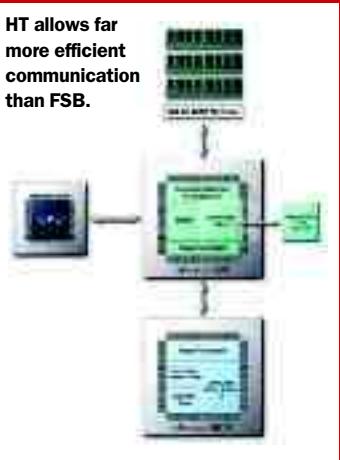
Intel still uses the old FSB/Northbridge/Southbridge format.

Integrated memories
Intel refuses to be lured by integrated memory controller, but can it compete against AMD?

Integrating the memory controller into the Athlon 64 was definitely a bold step, but one that did make sense – it cuts latencies significantly, and with so much data being passed through the CPU these latencies soon add up. On the downside, integrating the memory controller limits the speedy adoption of new memory standards, and AMD has only just made the move to DDR2 with its AM2 chips.

Intel still refuses to integrate the

memory controller into even its latest chip, the wonderful Core 2 Duo, but in order to compensate it has included technologies that improve memory access – including advanced pre-fetch algorithms that guess memory access for improved performance, and memory disambiguation to optimally handle the memory accessed. Even so, you can't help wonderful what Core 2 Duo would be like with an integrated memory controller harnessed too.

help monitor the running temperatures, voltages and frequencies of various core buses and interfaces. Manufacturers realised that once these buses could be monitored so they offered considerable scope for overclocking.

This is why the big players now offer overclocking on the fly with minimal user input – simply set in the BIOS the level of which you want to overclock your motherboard. If the sensors start to complain, the overclocking logic can throttle back so that your machine doesn't crash, and you get a tidy speed boost with the minimum of effort. Hardcore overclockers still have total access to all the settings, but with the benefit of an accurate thermal sensor. Those less interested in getting their hands covered in cuts, bruises and artic silver, have a quick and easy way of speeding up the system from a simply BIOS switch.

EXPANDING HORIZONS

Motherboards are effectively the breadboard into which you plug your tasty kit. The truth is, when it comes to expansion cards, we can only

latest CrossFire motherboard from Asus, the P5RD1-V Deluxe, uses the M1573 from ULi would suggest that perhaps it does. Indeed, in testing it's clear that ATI has had problems.

Unfortunately there aren't many other areas in modern motherboards where there is such a difference between components. The moment one manufacturer tweaks more performance out of a design, the rest quickly follow suit. Even the graphics subsystems aren't quite as different as you might imagine – both ATI and NVIDIA adhere to the PCI-E spec, which means that single cards in either produces near-identical results.

So, what of the difference between NVIDIA and ATI when it comes to dual-graphics solutions? It's impossible to compare the two directly until NVIDIA opens up its drivers so that SLI is supported on other motherboard chipsets. Until then, all we can testify to is that CrossFire works better on an ATI driven motherboard, while SLI needs an NFORCE variant. There is VIA's MultiChrome, which should, technically speaking, work on

"The moment one manufacturer tweaks more performance out of a design, the rest follow suit"

really think of one area outside of graphics that you might want to add-in, and that's the soundcard (and even that isn't necessary unless you're a real sound buff). You could add a TV tuner, and these do come in PCI Express flavours these days, but they also come in far more convenient USB styles too.

USB is one area where you would assume every manufacturer is equal, but this isn't the case. ATI was caught out recently when it was discovered that the USB controller included in its southbridge was underperforming. ATI was quick to respond, saying that it wasn't that important, but the fact that the

anything, although in practice a little fiddling may be needed.

WHAT'S NEXT?

What of the future of motherboards? Well in many respects we're already there, as the next generation chips that you've been eyeing up recently already have motherboards out there to suit. If you're an AMD fan, then the NFORCE and ATI Xpress chipsets will drive this processor. If you want something more cutting-edge, the NFORCE5 will do nicely, with a bevy of new features (although from our tests, these new features aren't earth-shattering).

Tempted by the Core 2 Duo? The Intel 975X has been out since the beginning of the year, and that will happily take your Conroe chips for the ultimate in performance. Intel 965 based motherboards are due out shortly, and these will cover the more affordable end of the market, while NVIDIA and ATI wait by the wings to tempt enthusiasts back to the dark side. In both instances though, the core technologies of these motherboards are already out there for all to see.

Jargon Buster
SPD

Examine a memory stick closely, and you'll find a small 128 byte chip that holds information about the manufacturer, timings and latencies. This is the Serial Presence Detect which, tells the motherboard what settings to assume, so you don't have to enter them yourself. What a boon.

Integrated networks
All motherboards now come with integrated network controllers, but are they any good?

Network controllers were one of the first components to start appearing in motherboards. They are cheap to include, don't demand much motherboard space, are easy to include on the ATX backing plate, and everybody uses them. While such controllers lack the high-end features that are the stuff of network administrator's dreams, they'll happily do everything you'd reasonably want to perform under Windows XP. Most even support Wake On LAN, enabling you to pull off some cunning tricks with your network to impress family and friends.

Motherboards now ship with one, or in some cases two, Gigabit Ethernet controllers, but do you really need a connection that fast? It depends on what you are doing – if you're shifting a lot of files around or streaming video, then you can see a 10-fold speed improvement over more traditional networks, but only if you've invested in a Gigabit Ethernet switch (£57 for an 8-port USRobotics switch) and of course all the machines you're connecting too need to be manufactured by Gigabit too.

There is another benefit going for an integrated Gigabit controller, and that is that you're assured of big name vendors that update their drivers on a regular basis – usually Broadcom or

Marvell. NVIDIA appears to have raised the bar with its nForce 5 chipsets, introducing two new technologies – FirstPacket and DualNet. The first prioritises outbound packets to offer lower latencies for games and VoIP, unfortunately it can't do anything with downstream packets, so you're still going to have to pause those torrents when playing Counter Strike and Quake IV, which is a shame. DualNet combines the two Gigabit Ethernet ports as a single connection and IP address, although to be honest we can't see any practical benefit for this as its hard enough to use all the bandwidth of a single Gigabit interface as it is. At least you can boast.
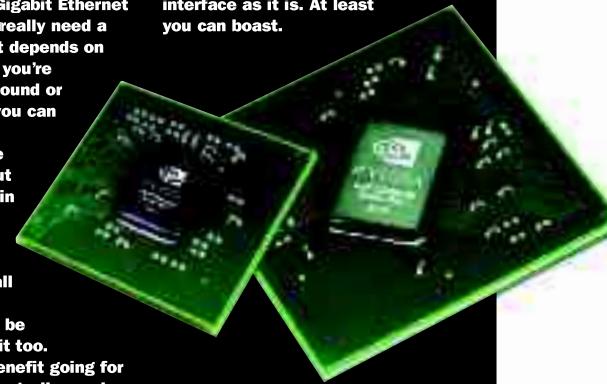
NVIDIA's NFORCE 5 boasts two new networking tech, but their usefulness is slightly limited.

Sound advice
Which onboard audio is best?

Onboard audio has seen significant improvements over the years, with Intel's high definition audio providing a significant boost since the first faltering steps of AC'97. Indeed these days unless you're an exacting audiophile, the quality of the output is great for gaming and more than capable of pushing your music around. 7.1 audio is now pretty much standard, with 5.1 support available at the very least. HD Audio offers 32 bit, 192KHz output on a variable bandwidth stream up to 48Mb/sec.

Intel's HD Audio also ushered in widespread acceptance of port-sensing, which means you don't have to climb round the back of your machine to work out which jack is for your

headphones or microphone – just plug in speakers or headphones, and the soundcard will work out what it is.

Don't worry if you're an AMD devotee, Intel's lead has been followed here too, with all the major manufacturers offering similar specified audio

There was a big fuss made a few years ago about the memory usage of integrated audio compared to add-in cards, but this soon became a moot point as they use roughly the same percent of your CPU.

How important is onboard audio to you? It could make or break your PC.

The motherboard explored

Getting under the skin of the latest mobos to see how it all fits together

ATX Power Connector
Intel upped the ATX specification to accommodate the power hungry Pentium 4s. This has resulted in an increase of the pin count on the main connector from 20 to 24 pins, and for its high-end 975 based motherboards, the separate 4-pin connector has double up to 8-pins. AMD has followed suit in with the 24-pin connector, so you make sure your PSU has the necessary power if you're planning on upgrading.

Memory slots
Four slots are pretty standard on even the cheapest mobos now that both Intel and AMD CPUs support dual-channel memory access. There isn't much consistency with colour coding – some manufacturers use the same colour for each channel, while others use the colours to indicate which you should populate first.

Processor socket
All those capacitors near the processor are needed to smooth the power signal to the CPU, but manufacturers can get a little too close here, making it difficult to actually attach your cooler. Not much of a problem if you're going to install your cooler and forget about it, but a major consideration if you're looking to overclock.

ATX Connection Block
USB ports, external SATA connectors, Firewire ports, ethernet ports and, of course, the audio jacks can all be found on the rear of the motherboard. The ATX face plate ensures that there are no gaps once installed into your case, but make sure your old one isn't fixed to the case – it can make for a tricky bit of DIY otherwise.

PATA Interfaces
The days of the old parallel IDE/ATA interface are numbered, with newer motherboards reducing the amount of connectors to just two, or in some cases, a single connector. This is fine for connecting your optical drive to the motherboard, but don't even think about connecting your optical and old parallel hard drive on the same channel – the performance will be appalling.

The North Bridge
In Intel's case the north bridge contains the memory controller and so is responsible for the connection to the memory. Both AMD and Intel use the north bridge to connect the primary graphics interface. This is connected to the south bridge to form the motherboard chipset.

SATA ports
You can expect at least four, and possibly up to eight, SATA ports on modern motherboards. RAID is supported as standard, and can be responsible for truly ridiculous disk arrays.

PCI Express slots
PCI Express, with its specific subset designed for graphics interfaces, is at the heart of all modern graphics card designs, and despite a few recent releases, this isn't about to change. If you can, pick a motherboard with dual graphics card support, as it gives you the opportunity to upgrade at a later date without throwing away your current graphics card.

LED readouts
Extra features such as LED readouts and onboard reset and power switches are intended for those that rarely have their cases closed. If this describes you, then the ability to see exactly what your machine is doing, and reset it at the click of a button can be a real boon.

The South Bridge
Handles all of the peripheral connections, and includes interfaces to the ethernet controllers, the audio interface and the likes of the PCI slots, USB ports and drive interfaces. This is becoming a more important component of motherboards as the feature lists continue to expand.

How each chipset compares…

Manufacturer	ATI	NVIDIA	INTEL
Chipset	Radeon Crossfire Xpress 3200	NFORCE 590 SII	975X
Processor support	AMD Athlon 64, Athlon 64 FX, Athlon 64 x 2, Sempron	AMD Athlon 64, Athlon 64 FX, Athlon 64 x 2	Intel Pentium 4, Intel Pentium D, Core 2 Duo
Graphics	2 x 16 PCI Express slots	2 x 16 PCI Express slots	x16, or 2 x 8 PCI Express slots
SATA storage	4 x SATA 3Gbps, NCQ	6 x SATA 3Gbps, NCQ, RAID	4 x SATA 3 Gbps,
PATA storage	ATA 133 (UDMA Mode 6)	ATA 133 (UDMA Mode 6)	1 x ATA 100
USB Ports	10 USB 2.0 Ports	10 USB 2.0 ports	8 USB 2.0 ports
Expansion	5 x PCI V2.3	5 x PCI V2.3	6 x PCI V2.3
Networking	100Mbit	2 x Gigabit	Gigabit
Audio	AC97 HDA	HDA	HDA

Overclocking

The key areas where hardware has to be improved before you consider overclocking

Overclocking was once a marginal past time for the idle performance rich. In case you've managed to ignore it all these years, the theory is fairly straightforward – take a component of your computer (generally the CPU, but the same theory can be applied to memory and graphics cards), and make it operate at a higher frequency than God originally intended.

That's a general overview, in practice it is a little more complicated in that you can improve performance by getting the processor to operate at a slightly slower overall frequency but by upping the external bus so that data is transferred quicker to the chip.

Overclocking is that it is an experimental process, and there are lots of subtle twists and turns that can make the process an all-encompassing pastime. As you don't know how far you're going to be able to push a chip with the cooling available, tentative steps need to be made to nudge the operating speeds up. Start playing with the voltages and

better coolers (such as water cooling), and you can get even more out of your kit. It does have risks, but that's part of the fun.

We'll be covering overclocking in more detail next issue.

If you really want to push your processor to the edge, then a ridiculous cooler is the way forward,

Tweaking the BIOS

Timing is everything, people

The BIOS is responsible for your PCs circadian rhythms – mundane processes that keep things ticking over, such as maintaining the accuracy of the real time clock, collating information on your hard drives, boot orders and a swathe of utterly unimpressive settings and features that most users don't even know exist. The BIOS is also where you'll find the timing, frequency and voltage settings for all of the major components plumbed into your system, and it's these settings that enable the component to communicate with each other in your system. It's important for normal use and key when it comes to tweaking your system (overclocking).

The settings in the BIOS are controlled by the CMOS utility, and this is where you come to set your CD drive as the main boot device when trying out Vista, and also where you need to go to try out settings for your new stick of memory. There are several types of BIOS out there, offering different levels of control, so it's never a simple task of saying go to this setting X and do Y, but after a little exploring you get the idea. Hit the [Del], [F1] or [F2] key to enter the CMOS configuration utility before your machine boots into Windows.

It may not look too interesting, but this is Tweak Central.

	NVIDIA	ATI
	NFORCE4 SLI x 16	Radeon Xpress 200
	Intel Pentium 4, Intel Pentium D	Intel Pentium 4, Intel Pentium D
	2 x 16 PCI Express slots	1 x 16 PCI Express slot
	4 x SATA 3 Gbps, NCQ, RAID	2 x SATA 1.5
	2 x ATA 133 (UDMA Mode 6)	2 x ATA 133
	10 USB 2.0 ports	10 USB 2.0 ports
	5 x PCI V2.3	5 x PCI V2.3
	Gigabit	100Mbit
	AC97	AC97

BENCH MARKS	3DMARK05	DOOM 3	FAR CRY
NVIDIA NFORCE 590	10,620	102 fps	73.4 fps
ATI Xpress 3200	10,624	73.0 fps	73.0 fps
NVIDIA NFORCE 4	10,618	73.6 fps	73.6 fps
ATI Xpress 200	10,600	73.3 fps	73.3fps

Far Cry (left) & Doom 3 (right) are cornerstones of our testing procedure, and as expected, the NFORCE 590 and ATI Xpress 200 were the top performers.

ATI SB450
ULi M1695
ATI RD580
ULi M1575
NVIDIA NFORCE 4

116 Mbps 194 Mbps 238 Mbps 204 Mbps 276 Mbps
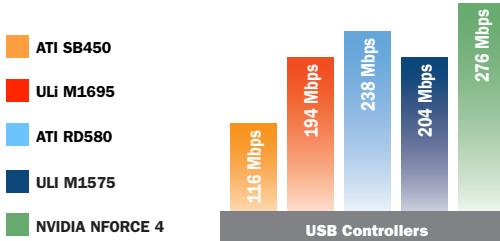
USB Controllers

USB controllers: NVIDIA's NFORCE4 was the clear winner.

The verdict

Having digested all this information, find out which motherboard is perfect for you

So, having looked at the important aspects of the modern motherboard, where should you punt your money: the budget offering, or the all-singing, all-dancing enthusiast motherboard? Well it depends on what you want to do with it, and to some extent how much cash you have to spend. If you're going to dabble with overclocking, then an enthusiast offering is obviously vital – it'll be slightly faster to start with, and you'll have room to bump things faster still.

For everyone else, the core technologies are the same on far more affordable motherboards and they can even offer limited overclocking potential too. It's worth noting that overclocking can be subtle, especially if you haven't got a top of the range kit (overclocking tends to focus on making the fastest hardware faster still). If you don't need the features found on faster motherboards, then think with your wallet and spend your money on a better graphics card, memory or processor. **PCF**
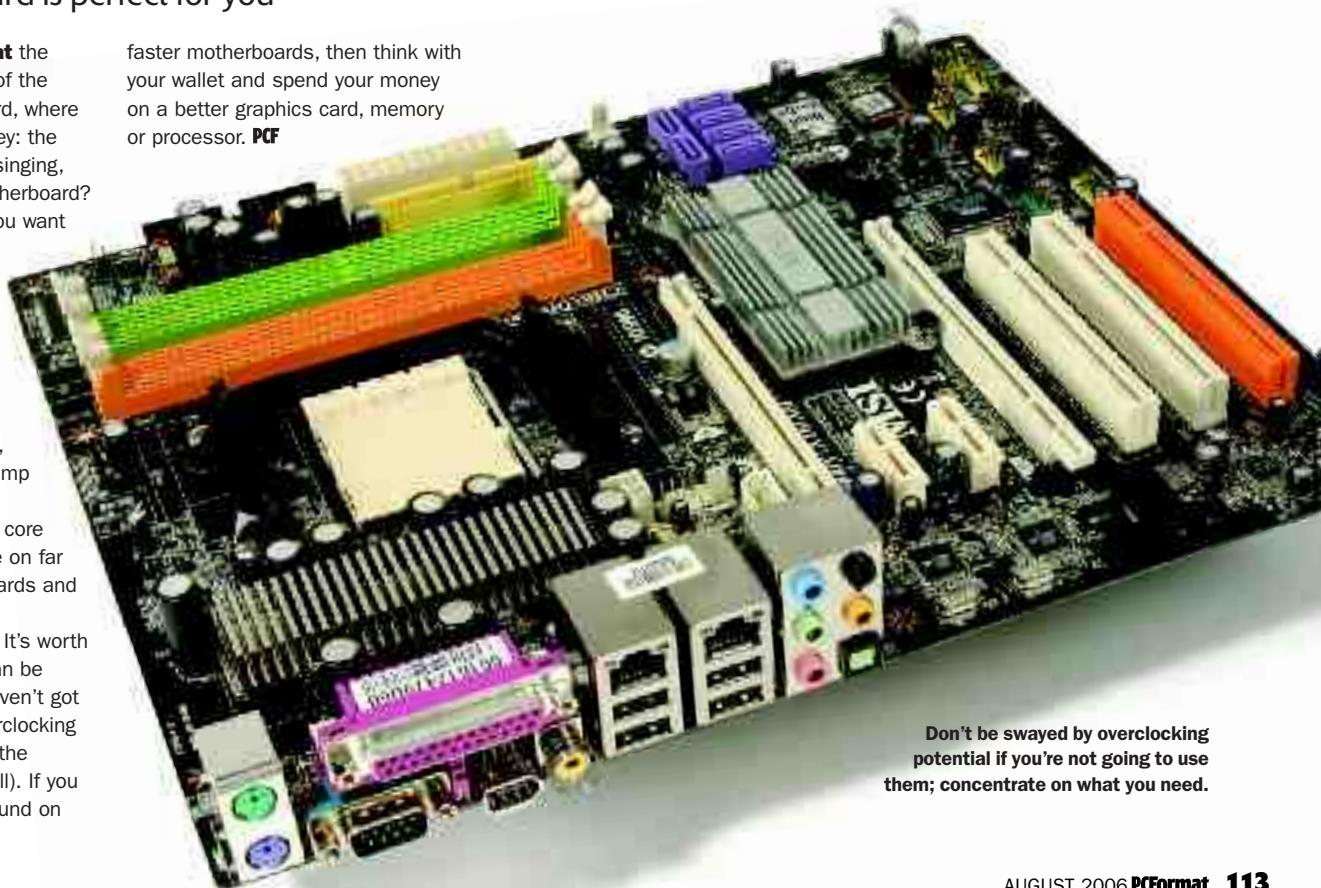
Don't be swayed by overclocking potential if you're not going to use them; concentrate on what you need.

PCFormat
on the disc
The very best software and games

HIGHLIGHTS

Sensible Soccer 2006

Old foes England and Argentina knock oversized heads in this playable demo of Codies' retro remake. Relive the good old days of ludicrous swerve and silky shimmying. It's like 1992 all over again…

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We want you to get the most from your free programs. *PCFormat* features more software guides than any other PC magazine in the whole wide world. Sometimes.

PLAY THIS

Micro Machines V4

Tiny toy cars do battle in this three track playable demo

Up	Accelerate
Down	Brake
L/R	Steer
A	Use power up
S	Drop power up

Ship Simulator 2006

Become the scourge of Rotterdam harbour.

Up	Increase throttle
Down	Decreased throttle
L/R	Steer
C	Change view
Shift	Engine to neutral

Earache Extreme Metal Racing

Because plastic racing clearly isn't extreme enough.

Enter	Accelerate
Ctrl	Brake
L/R	Steer
=	Change music
[and]	Attack left/right

Stoked Rider

Carve the fresh powder in this cel shaded snowboarding freeride fest.

Up	Forward
Down	Backward
L/R	Steer
Space	Jump
A	Edge

Cars: The Videogame

Disney and Pixar's latest movie parks on your PC.

Space	Accelerate
D	Brake
L/R	Steer
Down	Crouch
Up	Raise

REGULARS

Buyer's guide
The minefield of PC hardware can be a daunting place, but fear not, our comprehensive buyer's guides make it easy.

Benchmarks
Every other day it seems like there's a new graphics card released, our independant benchmarks keep you up to date with what's hot.

Latest drivers
Getting the optimal performance out of your machine is the goal of any PC owner. Keep your rig frosty with all the latest drivers.

All the apps you need
From antivirus to spyware scanners, we've got all the apps you need to ensure the smooth running of your system.

Giant heads mean balance problems for *Sensi* players.

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Every month we bring you the biggest and broadest selection of tutorials around

116

Brotherhood of clan

Join your fellow fraggers and discover the joys of glorious teamwork. In no time, you'll be a well oiled machine capable of dishing out serious online pain.

121
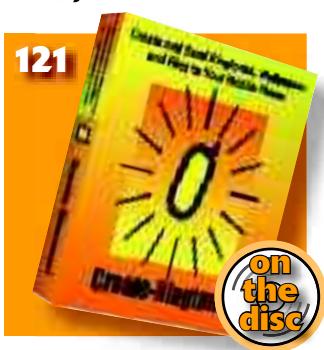
Compose your own mobile ringtone

Banish those irritating bleeps and poorly translated 50 Cent songs forever by creating your own virtuoso performances.

Full software

125

Create an MP3 playing robot

It's alive! Yes, finally Alec's labour of love is complete, so we can now demonstrate how to create a mechanised MP3 player.

Fruit of obsession

126
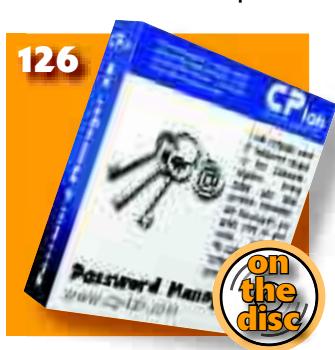
Never forget another password

Juggling passwords for every site you visit is a nightmare for all but the most swollen headed. Now you needn't bother trying.

Full software

ON THE DISC
Check out the 'on the disc' boxout in each workshop to find out what other relevant programs are waiting on the *PCF* disc, as well as how to install or upgrade new apps.

DO THIS
Go on, create something unique

For a full list of everything on the disc please refer to the disc's interface. Controls for the games are listed there too.

Brett James looks at the possibilities for fame and glory that can be yours if you join a gaming clan

There are thousands of clans competing around the world. Clans such as TRS (**www.sol-lan.co.uk**) have one simple idea – to play games and have fun. But the possibilities are endless, with the prospect of stardom and pro gaming status up for grabs.

TURNING PRO

One of the most successful and well-known clans out there is 4-Kings (**www. four-kings.com**). 4-Kings started out in much the same way as most of us, by playing on public servers, competing in ladder matches and eventually reaching the ultimate goal, becoming the UK's only pro gaming team, with some serious sponsors including Intel, Shuttle and SteelSeries, which mean the Clan players are paid, and promote themselves as stars of the 'esports' world.

A WORD TO THE WISE

Philip Wride, part of the management team at 4-Kings, has this advice for the neophyte clan member: "Although turning pro may be the ultimate aim for some, I have to stress it isn't all plain sailing and a lot of time, and effort is involved in making it to the top, much like in any other sport. In order to get there, make sure the game you play is enjoyable and that you are willing to put in the hours. For those that purely want to have fun then in the same way, do not lose sight of the overall goal, but still get involved because teams give you far more pleasure than random public servers."

Picture © Ben Woodward, 4 Kings LTD

A life of fame and fortune could be yours if your clan takes off. Maybe.

Have your say forum.pcformat.co.uk

"Run your clan like a business. Always manage team members thoughtfully"
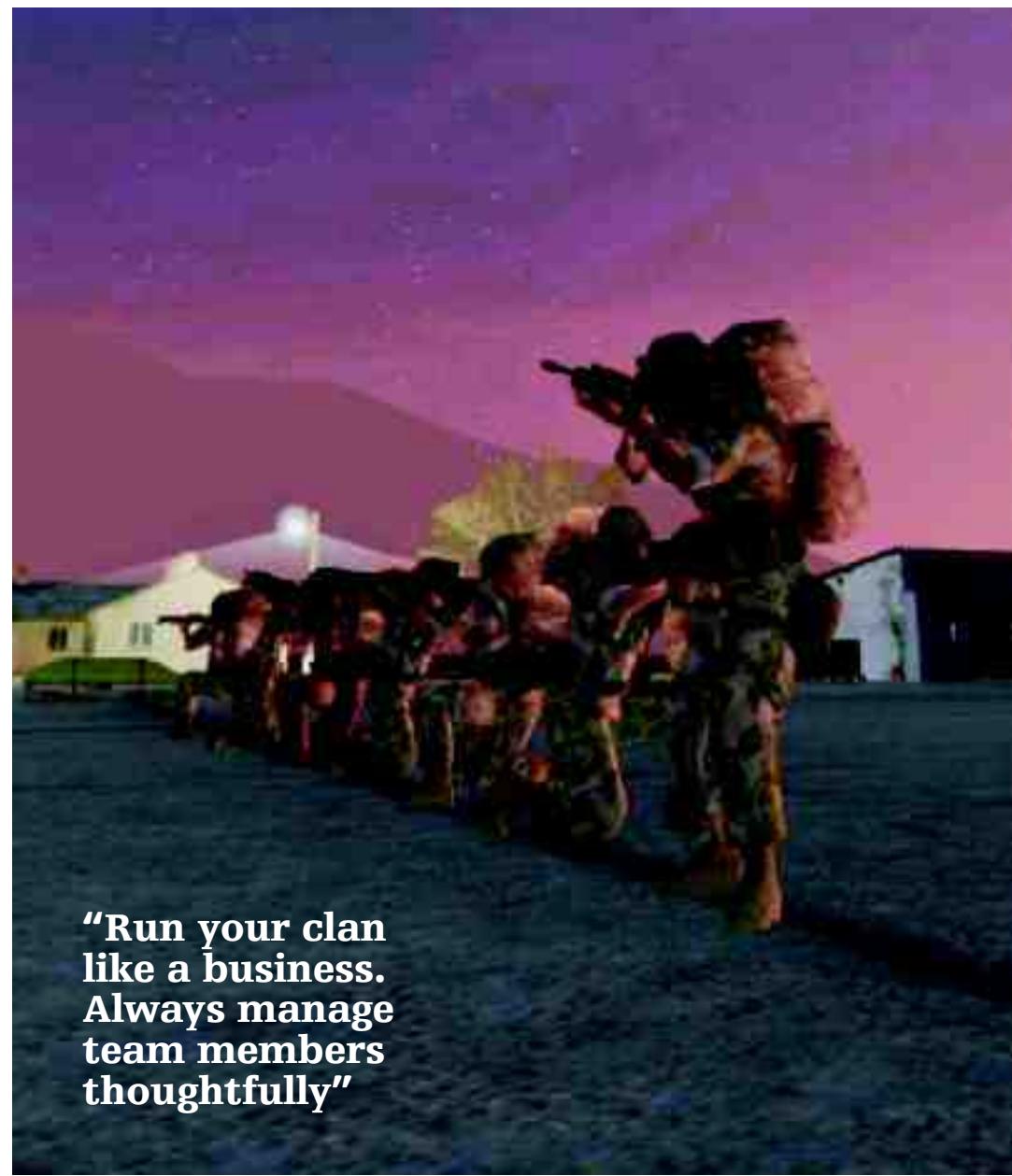
Start a gaming clan

Ever thought about creating your own online gaming gang? Brett James shows you how

The PC may be the definitive online gaming platform, but most people don't use it to its full potential. It's all very well facing the thrill of the unknown by dropping into a random server, but that way really doesn't lead to the best gaming experience. You might be fighting against, or worse, with, total mooks, either too dumb to wield an M4 or so incredibly selfish that you or any other player is simply a sack of meat standing in their way, no matter whose side they're on.

The key to both enjoying and becoming better at online play is joining a contingent of like-minded individuals – in other words, a clan. Many

How to create your clan
Construct an awesome fighting machine

1 Start by picking a short clan name, and a game you enjoy. Which game you play determines the number of recruits you will need. Visit **www.clanbase.com**, to see if your clan name is already in use, and while you're there add your link for others to see.

2 Creating a website or a forum is a must. With it you can display clan news, recruiting ads, times for clan matches, IP settings for servers and voice comms, discuss tactics, new recruits, match performance and ensuring clan members are aware of new game patches.

3 Check out **www.openci.de/index.php**. This is perhaps the ultimate tool for orchestrating your clan. With it, you can plan matches, organise squads and introduce a ribbons and medals system, allowing you to praise clan members and them to show off their seniority.

4 Swell your clan's ranks with friends to start with, then visit public servers and spectate, making notes of players who show ability, then use the in-game chat to approach them. You can find players' in–game stats at sites like **bf2s. com** or **ut2004stats.epicgames.com**.

5 Place ads or a recruiting form on your website. This should indicate which games your clan plays, age restrictions, personal interests, preferred style of play and ask them how they found out about your clan. Use the form to then contact the player, to arrange a trial.

6 Visit **www.clanyellowpages.com**, where you will find everything a Clan needs. You can add your link to the site, place recruitment ads, find players, PC gaming leagues links, support tools, advice for new clans, game performance links and more.

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people are put off by the idea of forming or joining a geek clique, but the important thing to remember is that it's no more than a well co-ordinated group of friends, having a good time.. Online prestige or infamy may come with time, but what's more important is that you're playing tactically with people you know and trust, rather than being at the whim of whatever drifters are hanging around a public server.

CLAN MECHANICS

The basics of recruiting members and establishing an identity are in the 'create a clan' walkthrough opposite, but let's go a little more into the team management side here. In an ideal world, you'll set up both a website and a forum for your clan. They're a key element for both promoting the name of your clan amongst the community and improving your game. Organise your forum so certain areas are off limits to non-clan members and recruits whose performance

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Turn the page for the rest of the tutorial...

Tools of the trade

How to make your clan run smoothly

1 Until you've rented a server of your own, pick a public one where you can practice with your clan. **www.game-monitor.com** may help you find a decent one. You can use tools such as *Xfire* (on the disc) – this messaging app lets you join the same server as friends from within XP.

2 Once you've got a few practiced members, register your clan in gaming ladders. That way, you can enter matches against other clans and increase your skills/prestige. **www.enemydown.co.uk** is a good place to start, and you'll find more links at **www.clanyellowpages.com**.

3 A key to a good clan is communication, and discussing tactics in detail both during and before a match is vital. Install *Ventrilo* (on our DVD) a VoIP tool many prefer over *Teamspeak* as it offers more control over how you hear sounds from other users.
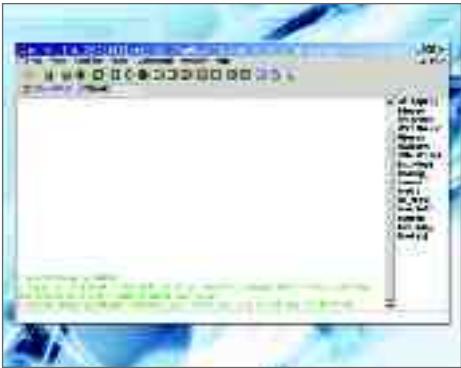
4 Announce forthcoming matches on your website or via email and use IRC (on the disc or **www.mirc.com**) to talk with other clans and arrange matches. IRC is the common form of communication between different leagues, teams and players.

5 Before a match, practice hard on the maps you are likely to end up playing. Have a solid core of players to take part in each game together, which will allow your team to learn from its mistakes, and have one or two backups on standby in case of dropouts.

6 Use a video app like *Fraps* or *Taksi* (on this month's disc) to record clan games and view potential recruits' performance. Look out for team players – did Joe Bloggs help the team or go solo, and did a player show ability with certain weapons, but not others?

you're assessing. The public area is good for chatting about clan activities as this will generate interest from potential recruits and rivals, but you'll need somewhere to plot the downfall of your enemies. Make sure you've got a calendar there too, so everyone can see when upcoming matches will take place.

Run your clan like a business. Don't dictate roles to members or slag people off in front of the team – manage them thoughtfully. Talk with them about what their strengths and weaknesses are – what classes, weapons and positions they're best suited to – so hopefully you can come up with mutually agreed roles, or work together to improve someone's abilities.

All the top clans have management teams, so why not yours? Select players to look after the design and maintenance of your clan website and forum, get others to look after recruitment or managing existing players, allowing you as clan leader to arrange matches and promote the clan.

PUT THE HOURS IN

Above all, practice, and get organised. A vague IM conversation about maybe doing something a week next Thursday, so long as the dog's already had his walkies, really doesn't cut it. You need a strict routine, getting together to play specific maps on repeat at set times every week. If someone in your vestigal clan habitually doesn't turn up to practice, you'll have to consider replacing them with someone more committed. The key to success is playing together as a team, not just being really good with the sniper rifle.

To begin with, your clan will get away with turning up on a public server and trying to play on the same team. Autobalance will make getting all your pals on the same side a headache, though, and you'll be at the mercy of the server settings. Soon, you'll need to rent a private clan server from somewhere like **www.game2xs.com**. For around £20 a month, you get not only a private playground, free from annoying idiots and under your complete control, but also a home for your clan and a place to play host to your enemies. There's nothing like a grudge match on home turf. A dedicated clan of 10 members should have no trouble raising £2 each per month via PayPal. **PCF**

Get the news with RSS

Richard Cobbett puts the world's news at your fingertips

Really **Simple Syndication, RDF** Site Syndication, Rich Site Summary… RSS, Atom, webfeeds… for such a simple, easy technology, news feeds have far too many names. The good news is that these terms are as complicated as this is going to get, and all you need to know is that they're all effectively the same thing.

Almost all regularly updated webpages, including news sites and blogs, now offer their content as a 'news feed' – an automatically generated XML file that you can subscribe to in dedicated feed-reader tools like *Bloglines* or *FeedDemon*. Every hour or two, these poll the site for any updates, and serve them up faster than you can make a terrible RSS/elbow joke.

There are two major advantages of this. For many irregularly updated webpages, you save making pointless trips in search of new content. Subscribe to news sites, like the BBC, or Google News, and all the day's events will be waiting for you when you fire up your machine. It's a great time-saver, and it really couldn't be any easier. **PCF**

FIND US!
Add blog.pcformat.co.uk to your RSS reader today

"The day's events will be waiting for you when you fire up your PC. It couldn't be easier"

1 First, we need a suitable website to demonstrate the wonders of RSS. Let's pick one at random from the entire internet. Ah, here we go, the *PCFormat* blog – your daily source for news, reviews, previews and… well, you get the idea. Visit **blog.pcformat.co.uk**.

2 Finding RSS feeds can be tricky. In *Firefox* and the new *Internet Explorer 7*, you should see the official 'feed' icon in the top-right corner of the screen, but not every site displays one. Click the icon for the feed's address and copy it into the Clipboard.

3 Alternatively, look for a link in the page itself. Common terms include 'RSS', 'XML', and 'subscribe to feed' – or you might see an icon. Most web pages are adopting the official feed symbol, but look for orange icons if nothing else appears.

4 With the URL in hand, 'subscribe' to it within your RSS reader of choice. We recommend *Bloglines* (**www.bloglines.com**) for online use, *FeedDemon* (**www.feeddemon.com**) if you don't mind paying, or *SharpReader* (online at **www.sharpreader.net**) as a freebie.

Fun with RSS Things to watch out for
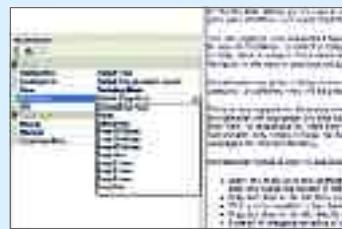
1 Feed aggragators like those mentioned above collect your RSS feed addresses – but not the stories you've collected from them – into an OPML file. You can import and export these at will, either to move between applications quickly, or to publish your blogroll.

2 By default, RSS readers are set to check for updates every one or two hours. Don't be tempted to lower this figure. RSS isn't intended for minute-to-minute updates, and many large sites will ban you if they catch you constantly hitting their feeds.

3 You're not restricted to subscribing to individual sites, either. Visit **www.pubsub.com**, **www.technorati.com**, or other services, and you can have any mention of set terms in blogs around the internet served straight into your feed reader.

4 RSS isn't restricted to pure text. It's the technology used for podcasts, and most new feed reading tools now have built in support for this: pulling attached MP3 files from posts and saving them to your hard drive, if not necessarily your media player.

Create free ringtones

James Carey takes on the Crazy Frog, with mixed results

Downloadable ringtones have become big business, but paying £3 for each one (and being more or less forced to take three a week from some companies) is a bit rich, especially when you find out that the super-cool tune you've just downloaded is actually on everyone else's phone on the bus, too.

So why not make you own? With *Create-Ringtone*'s audio converter and uploader suite you'll never have to pay for an over-used, over-priced annoying jingle again. Is there a piece of (copyright free) music you adore? Or a sound effect from your favourite game (*open source* game, we mean)? Or even the very voice of the person ringing you? In fact any piece of audio you care to upload can be used as your very own tone. Can you imagine the possibilities?

FREE FOR ALL

But the *Create-Ringtone* suite doesn't quit there. You can also convert and upload still images and even video clips directly to your mobile without any special cables or adaptors. As long as you've got a phone that's capable of visiting WAP pages, you're in business. In fact, for the vast majority of mobile phones the software will actually send the ringtone straight to your handset in the form of an SMS message, with no need to visit a WAP site at all. The full version of the *Create-Ringtone* suite can be found on our coverdisc. All you need to do now is follow these steps… **PCF**

> **"You can also convert and upload images and video to your phone"**

Personalise your phone with unique tunes.
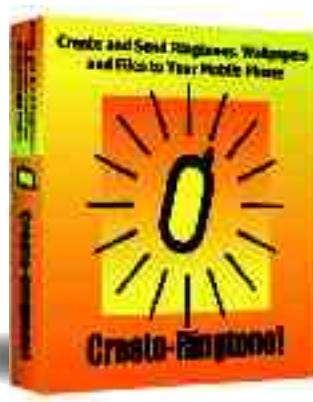
LAME that tune

Rip a song, then upload it to your mobile phone
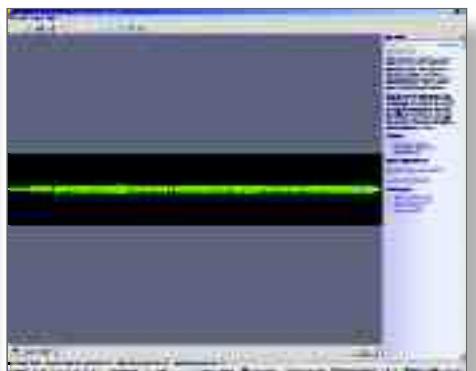
1 Go to **www.bluesquad.co.uk/future/ringtone/register** and register an account. Our special sign-up offer lasts until the end of January 2007. Once you've got an account, load up the *Create-Ringtone* software and choose **Audio Converter** from the menu.
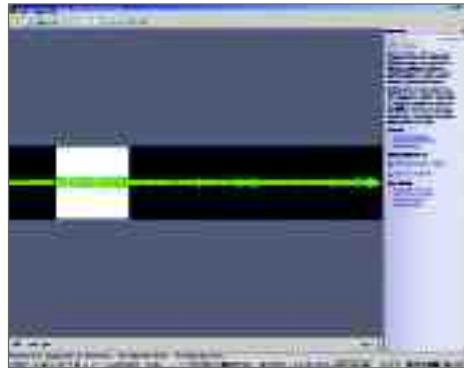
2 From the top bar click the folder with the musical note on it and browse to the sound file you want to convert into that rarest of beasts, the non-irritating ringtone. Select it an it will be loaded into the *Create-Ringtone* software. You should see a long green bar of soundwaves
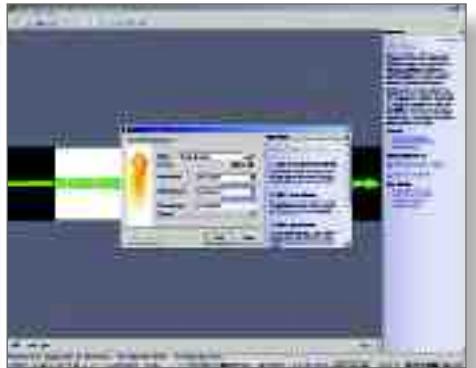
3 Start the tune off by hitting the **Play** button on the application window's top bar. Make a note of where the section you want to turn into a tone is (the riff you like, for example, or an intro you want to loop) then highlight it by dragging with the left mouse button.

4 From the **File** menu click **Send Ringtone Via WAP**. Select your phone model and operator, then punch in your phone number. Click **Send** and it should wing it's way to your phone. If not, the software provides a back-up code that you can enter into a WAP website to retrieve your tune.

Polish your podcast with high quality recording hardware. Karl Foster has all the gear you need

It's possible to whip up a production with a cheap mic and open source software, but a modest outlay will guarantee broadcast-quality results.

CONDENSER MIC

Unlike dynamic microphones, condensers require 48Volts of phantom power to charge the ultra-sensitive diaphragm that picks up your voice. Not only is it far more sensitive than a dynamic's diaphragm, it also captures a far greater tonal range, hence whatever is recorded sounds fuller and more natural. Retailing at around £130, the Rode NT1-A, pictured, plus a vibration-reducing shockmount, is an excellent choice for voice recordings.

AUDIO INTERFACE

So far, we've been dealing with system sound and gaming soundcards, but if you want extra oomph, consider an interface such as the Edirol FA-66, below. For around £200, you'll be able to record at a rate of up to 96KHz at 24-bit resolution which gives you an original recording that can be downsampled for distribution. Such devices typically offer the power required to drive condenser microphones.

EDITING SOFTWARE

More sophisticated podcasts require more sophisticated production software offering facilities to composite multiple takes, add effects, remove noise, optimise levels and more. Steinberg's WaveLab 6 (www.steinberg.net), pictured, costs around £250 and provides all the professional tools you need to obtain good results. You should also consider Sony's Sound Forge 8 (www.sonymediasoftware.com) and Adobe's Audition 2.0 (www.adobe.co.uk), both of which retail at between £200 and £300.

Have your say forum.pcformat.co.uk

Record a great podcast

While blogging may be an exciting new form of online self-expression, podcasting is proving to be a powerful means of getting your message across. The principle is simple: think of something to say, record it and put it online so that anyone with an MP3 player (not just an iPod) can download and enjoy. Here's how it's done.

PREPARE

You wouldn't want to narrowcast to the world off-the-cuff, so prepare your podcast. Content is king and it's best to ensure you've something engaging and entertaining to say, free of copyright restrictions and unlikely to land you in court for sedition, slander, promotion of terrorism and the like. The law applies as much to podcasts as to any other form of publication. Listen to voice radio – BBC Radio 4 is an excellent resource – for tips on presentation, make some notes to help you through the recording and aim to produce about 15 to 20 minutes of material. Anything more will likely lose focus and may become tedious for the audience.

PRODUCE

You don't have to spend much money to record a podcast. As shown elsewhere in this article, free open-source software such as *Audacity* is fine for recording audio on computer. Plug in a microphone and go. Make sure to turn down the speakers to avoid feedback, keep the mic away from the computer to reduce fan and background noise, and relax into your subject. Record the master podcast as a high-quality WAV file – CD quality is a good benchmark (44.1KHz at 16-bit resolution) – ready for post-production processing.

PROCESS

Play back the podcast and trim out gaffes, long silences and anything else that hinders the flow. If the level is a little low, normalize to -3dB, a level that won't distort on playback devices. Save the master file, then render as MP3 in your audio editor. Lower bitrates, under 128Kbps, for example, will induce noticeable artefacts in the form of warbling upper frequencies, whereas higher bitrates create larger files. Find the best compromise for your content. Voice-only podcasts should be OK in mono at 22.1KHz, 128Kbps. Music requires stereo and a 44.1KHz sample rate for best results.

POST

Make sure to tag the file – this is information that's embedded in the MP3 detailing the artist, year, genre and suchlike – via the audio editor's export dialog and give the file a sensible name, such as **PCFpodcast_2006_06_01.mp3**, which gives the subject and date. You can do this by

Audacious audio
Creating a basic podcast with *Audacity*
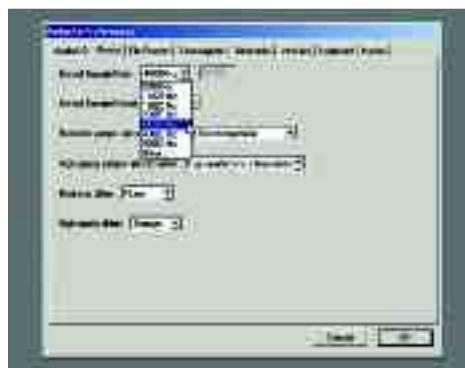
1 With *Audacity* installed, set up the quality of the master recording. We'll not be recording directly to MP3 because there's an amount of processing to perform before publication. Head for **File→Preferences**, or press **[Ctrl]+[P]**, and click on Quality, then choose your preferred sample rate.
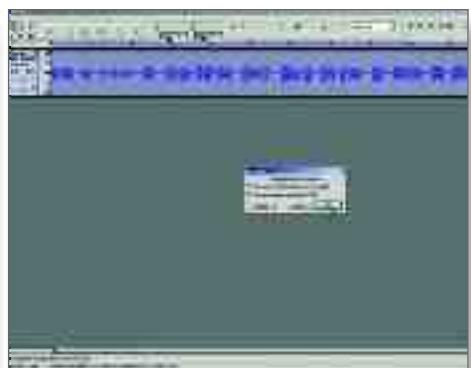
2 Here's our voice recording, rendered as a mono WAV file – there's little point in using stereo unless there's a music component to the podcast. The level is a little low, so go to **Effect→Normalize**. This finds the peak level and boosts the volume of the audio to an optimum -3dB.

"Think of something interesting or entertaining to say, and put it online for everyone to hear"

right-clicking on the file in Windows and choosing **Properties**. Upload the file to a directory on your web server and create an RSS 2.0 feed.

Confused? Go to **www.feedforall.com** and download a $40 utility for Mac or PC that makes feed generation a cinch. For code-heads, however, enter the code in the boxout opposite into a text file and give it the extension .rss:

Upload the RSS and MP3 files and create a link to the former so that people can subscribe.

PROMOTE

With your .rss file and MP3 creation now on the server (use **www.validator.w3.org** to check it all works), it's time to tell the world that it's there. For starters, rustle up some show notes and post them on your website. Then Google "podcast directory" and see the wealth of sites that will carry links to your podcast. A big one is www.podcastalley.com – it's merely a case of entering the title of your podcast, the web address, the link to the RSS file, a description, your email address, some keywords and genre. Getting the podcast onto Apple's iTunes Music Store is similarly easy – access **www.apple.com/support/itunes/musicstore/podcast** and click on the link to the podcasting form. Be sure, however, to check out *iTunes*' specific RSS tags, detailed under the **Technical Specifications** link. **PCF**

Podcast code
The nitty gritty you need…

```
<?xml version="1.0"?>
        <rss version="2.0">
        <channel>
                <title>PCF Podcast</title>
                <link>http://www.yoursite.co.uk/audio/
PCFpodcast_2006_06_01.mp3</link>
        <description>PC Format Podcast</description>
        <language>en-gb</language>
        <copyright>2006</copyright>
        <lastBuildDate>The date</lastBuildDate>
        <webMaster>yourname@yoursite.com</webMaster>
        <ttl>1</ttl>
        <item>
                <title>PC Format Podcast</title>
                <description>Fill in description here</
description>
                <pubDate>The date</pubDate>
                <enclosure url="http://www.yoursite.co.uk/
audio/PCFpodcast_2006_06_01.mp3"
                length="5621485" type="audio/mpeg" />
                </item>
        </channel>
    </rss>
```
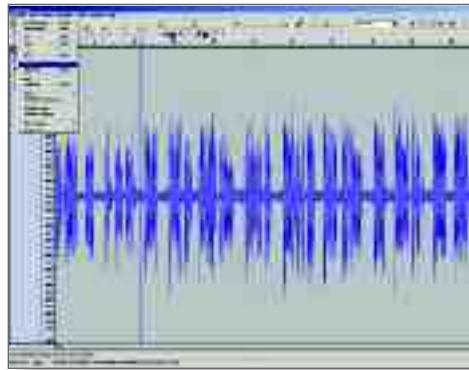
3 We've a few clumsy pauses in the podcast, but they can be removed to tighten things up. Select an undesirable region, be it a fluff, hiccup or a moment of brain-fade, then access the **Edit** menu and scroll to **Delete**. The portion selected will be seamlessly removed.
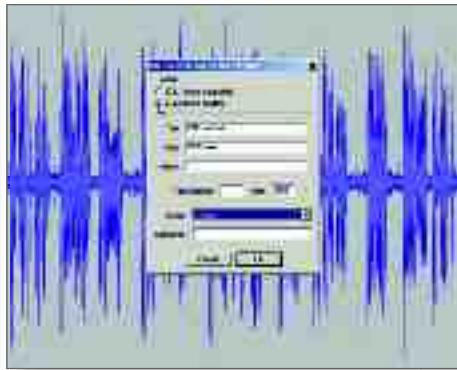
4 Now to render the podcast as an MP3 file ready for posting. The first time you access **File→Export as MP3**, *Audacity* will ask you to locate the required dll, available from **tinyurl.com/bka3e** – it's not bundled with the main program. Enter the tag information and click **OK**.

5 If you want to change the quality of the MP3, perhaps reducing it to make the file size smaller, or boosting it to counter compression artefacts, go to **File→Preferences→File Formats**. A value of 128Kbps is a good compromise between file size and quality.

on the disc

Throw away your TV

Alec Meer uses *ChrisTV* to give his old analogue tuner a second wind

Digital television is for wimps. A picture-perfect signal and an array of interesting channels – well, that's no kind of challenge, now is it? You're not a real man/woman/"I refuse to be categorised by my gender" unless you battle nightly with dodgy static, wobbly aerials and trying to work out if that pink wobbly thing you can see through Channel 5's rain of white noise is what you think it is, or is in fact merely Keith Chegwin's forearm.

If you still claim membership to this brave camp, *ChrisTV* can somewhat improve your analogue life, though it does also work with digital TV and cable too. And before you all write in, the app's called 'Chris tee-vee', not 'Christ Five' – and yes, it is made by a man called Chris. With a meaty recording scheduler and controls over image settings bordering on the anal-compulsive, you should be able to make your old TV tuner card muster a far better picture than before. **PCF**

1 *ChristTV* doesn't have the messiah's powers of omniscience, and thus doesn't support every TV card. This version only works with cards that use software MPEG2 decoding, which is primarily lower-end or older cards. You also need to register the software to disable the timebomb – do this at **www.chris-tv.com/future/registration.html**.

2 Before you install the app, grab the separate **Dscaler Deinterlace** plugin (on the disc). Then install *ChrisTV*, which will in turn start a configuration wizard. Be sure to check **activate Dscaler Deinterface filer** when asked, and select an appropriate resolution – higher looks better, but will tax the CPU more.

3 When scanning for channels, make sure you select the **UK**, **PAL I** and **air** under **TV input** (unless you're on cable). If the initial scan doesn't pick up any channels, try clicking **scan mode** on the right to switch to scanning by frequency. You can also choose to **use secondary channel scanning system** if you're having problems.
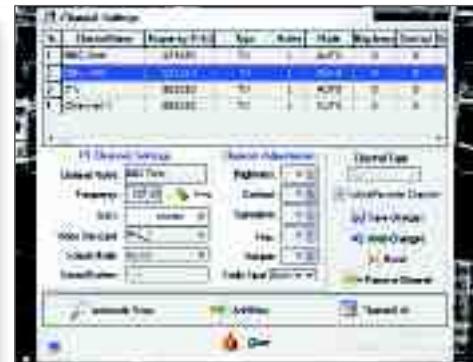
4 Next, click **channel settings**. Here, you can reorder and assign proper names to the stations your tuner's found. More importantly, you can refine individual stations, whether that's fine-tuning the frequency or altering the likes of contrast, saturation and volume for the channel only.

5 Time for a spot of scheduling. If you're on analogue TV, you're not blessed with all those channels that echo core terrestrial stations' programming, like E4+1, so you'll sometimes miss your favourite shows. With *ChrisTV*, you can queue up dozens of programs to record, in a choice of formats (AVI, MPEG or audio-only).

6 You can also set recordings that activate at the same time each day, week or month, and have the option to shutdown *ChrisTV* or even the entire PC once a recording's done – it's unfair on the environment to have your PC recording something on the first day of your holiday then remain on doing nothing for the rest of it, after all.

Build MP3otron

Alec Meer brings a classic 1980s toy bang up to date

1 First up, we needed to dismantle a 1GB Creative Zen Nano Plus (£66 from **www. creative.com**), as our only hope of squeezing it into Soundblaster's chest hatch (which usually houses a mini Decepticon that transforms into a Dictaphone cassette) was stripping away its plastic shell entirely.

2 Next, the really hard part – taking the knife to an iconic, £50 robot toy. Using a Dremel, one side of the cassette hatch needed removing entirely, and a large notch had to be cut into Soundblaster's torso to accommodate the MP3 player's girth. A sandpaper attachment to the Dremel helped smooth off the ragged edges.

Transformers: best toy ever. MP3 players: best gadget ever. It is *PCFormat's* need, nay, its duty, to design some cunning fusion of the two, and before the rumoured iPod Transformer appears in next year's inevitable crushing disappointment of a live-action movie (they've made Bumblebee into a Chevrolet, for God's sake). Of course, there's only one Transformer such a task could possibly be appropriate for: Soundwave, the legendary Decepticon who changed, rather ridiculously, into a cassette deck. A modernisation is long overdue. Unfortunately that particular 1984 action figure is too rare and expensive to carve apart in the name of science, so instead we're using a recent re-release of a repainted version of Soundwave, available for around £50 from eBay. Rather appropriately, given that we're using a Creative MP3 player, the robot's called Soundblaster. But enough prattle: here's how we did it. **PCF**

3 The trickiest stage, and the one at which the entire game could have been up. In order to make the screen visible and power button accessible, we needed to cut some dirty great holes into the brittle, transparent plastic on the front of the hatch. It was fiendishly hard to get a straight edge, requiring lots of post-op sanding.

4 While the Zen's PCB now fitted, the AAA battery kept falling out. So we rescued the Zen's casing from the bin and chopped off the battery hatch, only to find it was now too fat to fit in our robot. Again using the Dremel's sander, we shaved this down to a point where it was so thin that it wobbled precariously in a light breeze.

5 Hurrah! Our skeletal MP3 player clicks into place snugly. Unfortunately the crucial headphone socket was blocked by a wall of plastic, so time for more carving. As you can see, though the port's now in place, we made a bit of a pig's ear of its surroundings – we'll revisit this mess another time, placing a new front around the socket.

6 Soundblaster's increasingly violated hatch required more butchery – in order to control playback, we needed to cut out notches for the scroll wheel and volume buttons. Without the Zen's frame, these weren't held in place, so we had to use superglue. Once again, careful sanding and painting were needed to tidy up the mess.

Essential security

Password Manager XP comes to the aid of forgetful **Dave James**

Over the course of your travels on the internet, the chances are you've signed up for a vast number of free email, forum, PayPal, eBay and internet banking accounts, each of them with a unique password.

If that's the case, you'll no doubt have numerous passwords cluttering up your poor wee brain, and we all know how hard they are to remember when you haven't visited a particular site for a while. Relying too heavily on password memorising functions within your chosen browser works in the short term, but clean out your cookies folder, and you could be in trouble.

MANAGERIAL MASTERY

This is where *Password Manager XP* comes in, setting up a secure database of all your passwords. You have a choice of up to eight encryption algorithms, from 128-bit key encryption to 512-bit, all of which can be used at the same time – just to give any would-be hackers eight levels of hell. *PMXP* also integrates itself with *Internet Explorer*, giving you extra password options via the right-click menu. There's even a password generator, so you need never remember an obscure login ever again. And won't keep using the same password everywhere you go. Shame on you.

A fully featured copy of version 1.99 is sitting on this month's coverdisc, just waiting for you to install. One of the really clever features is the ability to load the entire program, databases and all, from your PC on to a removable USB key for those on the move. **PCF**

Don't leave anything to chance – let *Password Manager XP* keep a secure eye on your multiple passwords.

> "Eight levels of encryption will give would-be hackers eight levels of hell"

Forget me not

How to steer clear of password repetition

1 Create a database by heading over to **Database→Create new…** Now you can set the name of the folder, create the last password you'll ever need and set which encryption algorithms you want to use. You should also include a note to yourself to remind you what lies within.
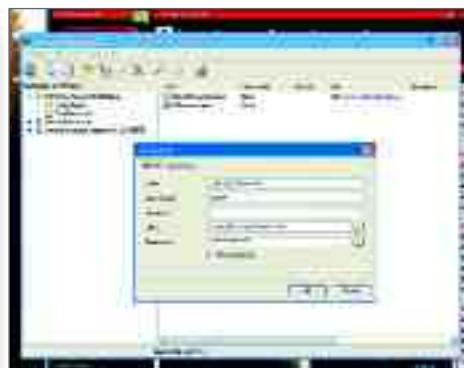
2 You can make individual folders to segregate different password types by clicking on the large folder icon in the toolbar. Setting a new password record is simply a matter of clicking the next icon along and adding a title, URL and finally the password.
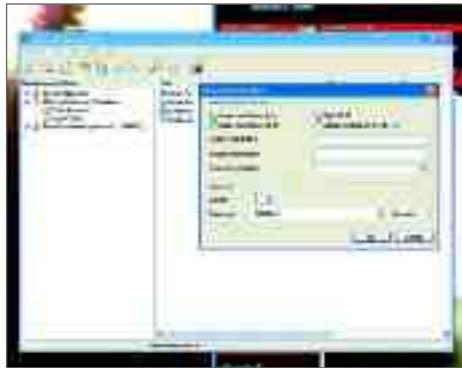
3 Generating a login for a new site is easy in *Internet Explorer*. Right-click on the password frame of the site and select **Generate password**. Once it's generated, right-click again and select **Save password**, which will take you to the new record screen.
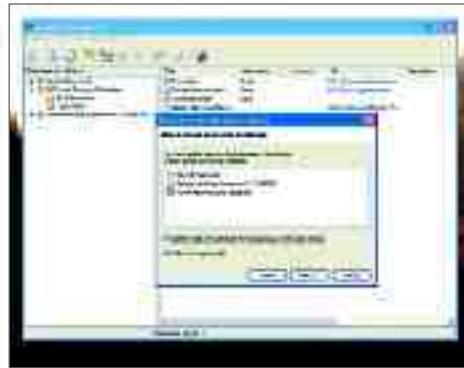
4 When your database is set up, you can take it on the move. Nip over to **Tools→Install to removable device Wizard…** and choose which device to install to. Then select which databases you want transferred, whether you want it read-only and finally click **Next** to install.

Find WiFi networks

Mike Channell taps into the invisible internet, with *WirelessMon*

When dealing with traditionally fickle wireless signals, sometimes the visual clues that your WiFi has left the building simply aren't clear or timely enough. With modern routers' tendencies to come packed with slightly hobbled firmware (one of *PCF*'s great unsolved mysteries, that one) getting hoofed off the network can be a frequent and frustrating occurrance. Luckily *WirelessMon* is here to give you an simple yet detailed view of what is happening to those radio waves that are swirling around your head. Working in conjunction with your existing drivers, *WirelessMon* keeps a tally of what's going on behind the scenes and can visually represent the wireless signal as a series of neat concentric circles.

FREE TO ROAM
We've stuck the full version of PassMark's *WirelessMon 1.0* on our DVD, which is usually sold for $19. Installation is straightforward – there's no need to register, enter a serial key or connect to the net, which really is handy if your wireless is borked beyond even hope.

Our love affair with WiFi has so often been wounded by poor signal quality. Take some time fiddling with this tool's useful wireless monitoring features, though, and you'll be sniffing out solid networks and wandering the web in no time. **PCF**

In association with

CORSAIR

You'll be surprised the places that you can get WiFi reception.

Upgrade

Tuning in
What Windows won't show you

1 This is the screen you should see when you boot up. If you can't see a signal strength indicator, you may not have selected your wireless card. Choose it from the drop-down menu marked **Select Network Card**. Now click the **Graphs** tab to the left of the window.
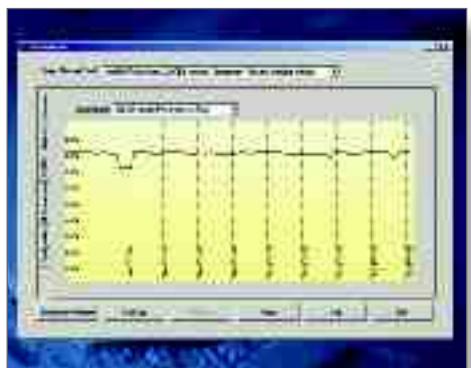
2 This graph shows a live signal strength rating. This is handy when you're parading around with your laptop looking for the prime spot for joyous uninterrupted coverage. Again, using a drop-down menu (marked **Select Graph**) you can also check data rate.
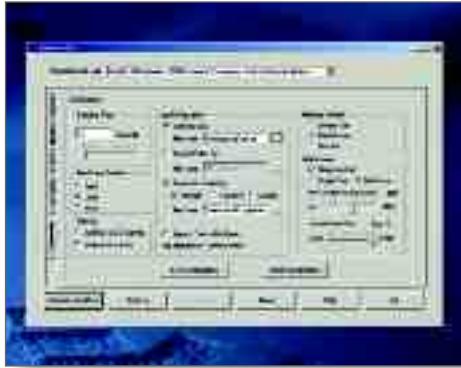
3 Click on the **Configuration** tab to tweak settings such as the sampling rate (the lower the time, the more often the monitor checks the signal), where you want log files to be saved and the Mini Window. To see this mysteriously named feature, click **Switch to Mini Mode**.

4 Voila! You can turn the corner of your screen into a wireless indicator. Now you'll know if your wireless has dropped out before you get booted out of *Messenger*. If placing the visual in the top right corner gets in the way of your work, simply click and drag to move it.

ON THE DISC

WirelessMon 1.0
This useful app will help you keep an eye on your wireless connection with a clean interface and signal indicator.
www.passmark.com

K9 Web Protection
Now that you're connected, you'll want to protect the kiddies from the evils of the interweb. K9 steps in and barks angrily at web nasties, stopping youngsters from seeing anything untoward. It's also free.
www.k9webprotection. com

Firefox
Surf in style with *PCF*'s browser of choice. We don't love it for its groovy name: it beats *Internet Explorer 6* hands-down for features.
www.getfirefox.com

Screamer Radio
Can't get out to the Caribbean this summer? Bring the sun-kissed tropics to you with *Screamer Radio*, which, amongst other things, tunes into laid-back dub direct from Jamaica.
www.screamer-radio. com

Luis Villazon
AT BEST, DERISORY

Ask Luis...

ALL YOUR PC QUESTIONS ANSWERED

Don't panic

Blowing away the mists of ignorance by means of an inexhaustible flow of hot air: Luis Villazon is the *Mistral* of the computer world

Power problems. You'd be amazed the trouble a faulty supply can cause.

PSUs
Switching on

Q Whenever I press the On button on my computer, it refuses to boot up. It makes a sound as if the fans are coming on but that's it. I then have to press the reset button to turn it on. It started happening after I moved my computer to another room and left it unplugged for about a week. When I put it back it started doing this. I had this problem once before but it went away fairly quickly. Is there anything I can do to fix it? Or is it one of those things I'm just going to have to put up with?

PS I love the way you make everybody seem like an idiot when you answer their questions.
ZACH BROWN
z.wbrown@gmail.com

A But surely only an utter moron would say that, *knowing* that it presents an irresistible invitation for me to insult you. Normally I don't even need an invitation – I just turn up with an empty wine bottle wrapped in a sheet of paper and say "I'm of friend of, er John. I mean Steve!" But here, propped against the toast rack on the breakfast table is this embossed card with gold edging that reads "Mr Zach Brown formally requests the pleasure of your company so that you can make him seem like an idiot. RSVP." Well, I am happy to accept and my wife will be accompanying me.

Now, once you have taken my coat and handed me a drink, I shall explain that in a working PC, when you press the 'On' button, the motherboard uses the power from the five-volt standby rail to send a signal to the PSU requesting it to power up all the other rails. Since the PSU can take up to half a second to stabilise all the voltages on the output rails, the motherboard generates a continuous reset signal to the appropriate pin on the CPU while it waits. This is equivalent to you holding the reset button down on the front panel and stops the CPU from initialising. When the PSU is satisfied that it is generating a consistent voltage, it puts a 5-volt signal on the "Power Good" line to let the motherboard know. The motherboard then releases the reset line and the boot sequence begins in earnest.

Your PC has got stuck just before this point. There are two possible causes for this. Either the PSU is failing to assert Power Good, even though the power is fine, or else it is asserting Power Good but the motherboard isn't listening. Since the boot sequence is initiated by the falling edge of the reset signal (ie when it drops from high to low) your PC never starts because the reset line was never asserted in the first place. Pressing the reset switch forces the reset line high and then lets it drop so the boot process can begin. Since this problem began when you moved your PC, I suspect that all that has happened is that the ATX power connector has worked slightly loose where it plugs into your system's motherboard, and the

Power Good signal just isn't getting through consistently.

This probably seems like a really long way of saying "reseat the power connector on the motherboard" but that's how it is with you idiots, you have to spell everything out.

HARD DISKS
Critical mass

Q My Uncle was able to turn a normal hard drive into a mass storage device, only he doesn't remember how. I have a spare hard drive and spare IDE cables. Please help, I'm desperate for this to be resolved soon. I looked everywhere on the net and couldn't find a decent answer.

KYLE
lynn@lynnrogers.wanadoo.co.uk

A Two things sprung to my mind as I read your letter, each vying for the honour of being first in my response. One that if you have already searched the net, what makes you think asking me is going to help? I'm basically just a ruder version of Google, you know. You won't flatter me by saying I'm your last resort; I want the low-hanging fruit here. Luckily, my other thought saved your letter from the Recycle Bin, which is that you are clearly a bit of a pilchard. A hard drive *is* a mass storage device. What else could it be? With what additional properties do you hope to imbue your drive by transforming it in this way? Do you want a device that actually stores mass instead of just data? That would be a cardboard box. You don't need IDE cables for that, unless you are planning to use them to tie it shut.

Or do you want to convert an internal hard disk to an external device? I can imagine wanting to do that – indeed, I *have* done that – but I am having a somewhat harder time visualising how your Uncle could have done this and then forgotten how. It's not exactly an arcane process. You buy an external drive enclosure (just a box with a power supply, really). You put the drive in it. You connect up the cables. How can you forget how to do that? Your Uncle must be an even bigger doofus than you.

STORAGE
Don't trust your hard drive

Q I was just reading the letter in *PCF187* from the guy with the blown hard drive full of "invaluable data". I'm surprised you don't pour several hod-loads of scorn on people who trust irreplaceable data to what's basically a $30 piece of mechanical/electronic tat. People who happily download all their once-in-a-lifetime baby photos into budget price laptops need a liberal application of the clue bat to the base of the skull. Hard disks die. When they do you generally lose the lot, forever. Backups are easy and cheap. I think it's your civil duty to point this out to people.

NAME WITHHELD

A Pah! I have no moral responsibility towards you lot! I don't answer your questions out of any high-minded desire to bring light where before there was only unremitting darkness. I answer them in much the same way as a horse might swish irritating flies from its behind. That is, in the vain hope that this will make them go away. I *want* people

who don't back up to lose their data. It's all rubbish data anyway. Baby photos? Who wants to see your baby photos? All baby photos look the same. As do all wedding videos, holiday snaps and here-we-all-are-opening-our-presents-on-Christmas-day photos.

I think people who don't back up their hard disks *want* to lose their data. They feel burdened by the weight of 12,540 over-sharpened, badly lit, four-megapixel jpegs of Aunt Ethel's 90th birthday party, but they can't get rid of them because they are "irreplaceable". So they just take their hard disk out and leave it in the rain on a wind-ravaged hilltop somewhere and wait for Nature to take its course. This is progress. In the old days, it would have been Ethel herself, after all.

GET A LIFE
Soo 1998

Q Eighteen months ago, I upgraded to *Girlfriend 1.0* from *DrinkingMates 4.2*, which I had used for years without any trouble. However, there are apparently conflicts between these two products and the only solution was to try and run *Girlfriend 1.0* with the sound turned off. To make matters worse, *Girlfriend 1.0* is incompatible with several other applications, such as *LadsNightOut 3.1*, *Football 4.5*, and *Playboy 6.9*.

DEREK
luckydeks@eject.co.za

A *MyDog 2.1* comes up with the error message "Cannot load nose.dll". If I click **File→Smell**, I get "This program has encountered an unbelievably old email joke and will be terminated. Any unsaved punchlines will be lost."

CPUS
Overclocking rules

Q Recently I read in another magazine a topic on how to overclock your CPU. My CPU is AMD Athlon 64 3000+. My overclocking was a success, but it was short-lived. My PC later booted back into safe mode, telling me to change my HT frequency and core frequency back to the way it was. And so I changed it back and it was fine. Later, I decided to try overclocking the system again, but I made a tremendous mistake by doing so. When I was going to the core frequency settings in my BIOS, under it was CMOS settings. The settings had stuff like voltage control and so on. My default

Bedside table
This month, Luis is reading…

The Manuscript
Authors Michael Stephen Fuchs **Publisher** Macmillan New Writing
Price £13 **ISBN** 0-230-00009-6

This eponymous document contains the Meaning of Life that has been hidden on a "deviously encrypted web site" and this is a thriller novel that follows the various good and bad guys tracking it down. Unusually for a novel about computers, the technical stuff is well done and though the plot isn't very complex, the action sequences are gripping. But the central premise is ridiculously contrived, and all the existential angst belongs to the author rather than his characters. This is a good airport read but, ironically, you won't find the meaning of life here.
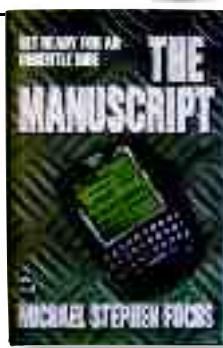
FAQ
Windows Media Photo

JPEG could be a thing of the past in a few years' time.

What devilry is this?
The proposed successor to JPEG. WMP is a new format that uses improved compression to preserve more detail, or get the same image quality in a smaller file.

How much smaller?
JPEG compression shrinks a digital photo's file size by a factor of six. Microsoft claims that that WMP will be able to achieve 12:1 compression with no visible loss of quality. Even at 24:1, WMP will still look better than a JPEG.

How does it work?
The pixel codec is a secret, but probably involves some form of discrete wavelet transformation. The whole thing is wrapped up in a tagged file format rather like TIFF.

Why not release the codec for TIFF?
MS wouldn't be able to control the tech and make a fortune from licensing.

Should we boycott it?
The JPEG standard is now very old. JPEG2000 is unlikely to take off, because of licensing issues. By developing its own pixel codec, WMP could save us all half our image bandwidth.

When will it be available?
Support will be built-in to Windows Vista but it will probably be included with Internet Explorer 7 before then.

Read more at
www.microsoft.com/whdc/xps/wmphoto.mspx

setting was "automatic". I accidentally pressed [Enter] and it changed to "manual", and all the voltage and other settings was automatically highlighted as a user-defined setting.

I was in a big hurry at the time, so I didn't think it would be important to change it back. So, I changed my core frequency and HT frequency. When I restarted my PC, it froze completely, all you see is a blank screen that's doing nothing at all!

I read my motherboard's manual and it said that all BIOS info was saved in the CMOS RAM. My friends told me that I must just have my CMOS battery replaced and the motherboard will reset itself to a default setting that will be saved to its RAM. Is that true? Or must I replace my entire motherboard, which I *don't* have money for?

TREVOR PHILIP
trevor.philip@yahoo.com

A You overclocked your PC and it didn't work so you overclocked it again and also randomised the CPU voltage. That's so dumb we need a different word to convey just how dumb it is. How about *abderite*? A nice classical greek word that doesn't get out as often as it should. (It means very, *very* dumb). If you are lucky, your CPU is not starting because the default voltage values in the BIOS setup program are too *low*. If this is the case, you can reset the parameters saved in the CMOS by removing the battery or shorting out the CMOS reset jumper on the motherboard. This should leave you with a system that will boot up, although there will probably be lots of other parameters that have defaulted to ultra-conservative values that might take about 20% off your performance until you set them all back.

If you are unlucky, the default voltage values were too high and your CPU is not starting up because you have melted it. Don't worry though, your motherboard is probably still fine.

MEMORY
Substitute RAM

Q RAM is like memory, right? So, why can't we donate some part of our hard drive or other hard drive that's not in use to act as RAM, because it's also memory? Please don't diss me too much if there is a simple reason this isn't the case already.

WILLEM WYK
willemwyk@iafrika.com

A Disc space and RAM are both forms of storage and in that sense they both count as memory, but but that token is the post-it not on your monitor. And your own (doubtless very limited) brain, come to that. Just because two things can be lumped together under a common supercategory doesn't make then. interchangeable. Shire horses and geckos are both vertebrates, but if you have ever tried to stick a shire horse to a window, you'll have realised that the similarities between them end there.

Disk space is used as an alternative to RAM. A long time ago, it used to be called virtual memory, and much was made of the fine tuning thereof. Nowadays Windows just quitely uses your hard drive as an verspill area for RAM without troubling you about how much it is using or when. You no more need to explicitly donate this space than you do the income tax that is deducted from your salary – it just happens.

OPTICAL DISCS
DVD woe

Q I am attempting to back up my DVDs but I would like them to play in any DVD player. If I use a 1:1 ratio, the disc plays in any DVD player. If I compress the movie, in at least one DVD player the movie played in fast forward. I'm not sure why, and I was wondering if you had any insight on my problem.

STAN EUBANK
s_eubank@yahoo.com

A Presumably because your "compression" system is deleting every other frame, or something. If you want your copies to play in any DVD player, no matter how old it may be, it stands to reason that you will need to write them using the original DVD standard, and that means copying the disc onto another disc. If you want more compression, you can use MPEG 4/DiVX but this will only play back on newer hardware.

"In my opinion, antivirus software is a poison worse than the disease it purports to cure"

SECURITY
Should I scan?

Q I have been looking at purchasing an antivirus kit before I connect a new computer to the internet. I have *Norton Antivirus* running on an old laptop but the subscription has expired. I was wondering, do you have any advice or preferences for this type of software?

PETER DUNCAN
therock_ni@hotmail.co.uk

A My own personal opinion, oft repeated in these hallowed pages, which does not necessarily reflect the views of *PCFormat*'s editor, nor those of Future Publishing, is that antivirus software is a poison worse than the disease it purports to cure. The only people who actually need to burden themselves with antivirus software are those so ignorant that they download software and click on email links indiscriminately, and who have also inexplicably turned off Windows Update. These people are beyond all forms of redemption in my eyes; they are dead to me *[But they pay your wages – Ed]*. For everyone else, you will lose far more troubleshooting hours to the low-level system conflicts caused by your antivirus software than you ever will to the viruses themselves.

This concludes the op-ed section of *Ask Luis* for this month. I return you now to the advertised

Picasa
Organise your photos with Google's free tool

1 Download
You can get *Picasa* from **picasa.google.co.uk**, or our cover DVD. When it runs for the first time, it will ask to catalogue every photo on your hard disk. This can take over an hour to complete, but you will only need to do it once. In its default confuguration, pictures are sorted according to the folder they are placed in and by year.

2 Organise
Once your photos are indexed, you can add keywords, organise photos into virtual collections (with the same photo linked to multiple albums) or password any photos you want to keep private. You can also add a caption that is saved with the image file itself or mark your favourite pictures with a star system.

3 Retouch
Picasa includes a handful of the most common filters and effects and lets you apply them to your photos with an incredibly intuitive interface. Everything is previewed and undoing any mistakes you may make is easy. Even the crop tool has presets for the standard print aspect ratios, which is, frankly, genius.

4 Backup
To protect your pictures against disk failure, you can burn them to CD or DVD. *Picasa* keeps track of which ones have already been saved on a previous session and tells you how many discs you will need for the photos you have selected. When you are happy, click Burn and you'll be prompted to insert the discs.

programme of objective fact and religious dogma.

PSUS
Random

Q I have a Toshiba satellite A30 laptop. It has been working exactly as you'd expect for some time, but recently it developed an infuriating fault. The machine has suddenly started arbitrarily 'cutting out'; turning itself off for no discernable reason. Can you tell me what the likely cause of this is?

I'm inclined to think it might be an overheating problem, or possibly some sort of pernicious virus? I have McAfee virus scan installed on the laptop, but so far it has not picked up any virus infection. When I instructed McAfee it to run a full system scan, that is. The problem seems to happen at random, anything from 15 minutes after bootup to over an hour.

GLENN KELLY
gk1962@tiscali.co.uk

A Instead of wasting time looking for non-existent viruses (see the previous question) why don't you track the cause of your problem down by testing the conditions that cause the laptop to cut out? Does it happen faster when the laptop is doing something graphically intensive or in a hot room? This might indeed indicate an overheating problem. Does it happen when it is plugged into the mains or only on battery power? The battery contacts might be loose or have a dry solder joint somewhere. Does it literally blink off, or does the laptop put itself into hibernation mode? If the latter, this might simply be that the laptop is no longer holding much charge. Lithium batteries can be easily damaged by overheating and they will degrade after a few hundred charge and discharge cycles as well.

INTERNET
Google this!

Q Luis, can you Google "email" without your browser crashing? If you try it with "www", it yields 25,270,000,000 matches. Go on – give it a go!

ANDY LILLEY
and7@blueyonder.co.uk

A Twenty five billion matches, eh? This despite the fact that Google only claims to index around eight billion pages – something weird is clearly going on there. Anyway, searching for "email" in Google returns just 6.5 billion matches, and takes less than half a second to do complete, whichever browser I use. Look, I'm not completely sure what your point is here. The worldwide web is really big? Lots of pages contain the word email? Browsers can be made to crash quite easily if that's your goal, but not just by running a highly non-specific web search.

Even if it was the case that the effort involved was proportional to the number of matches returned (it isn't, by the way), all the work happens at the Google server end. Your browser still just displays the first ten matches. As far as *Internet Explorer* is concerned, it's just another web page – and a fairly sparse one at that.

OS UPGRADES
Switching to XP

Q I have Windows 98 Second Edition running on my home PC at present, but I want to install Windows XP. If I do that, would I lose all my programmes and files? Or would nothing change?

BRENDA FOY
foy674@btinternet.com

A The installation process will preserve all your existing apps and any applicable registry settings. If your PC was bought with Windows 98 on it, upgrading will probably be worthwhile, but if you bought it with Windows 95 and this is your second or third upgrade, I suggest you sell it and get a new machine for £400 or so. XP will need at least 256MB of RAM and it will probably feel slower than Win98 with less than 512MB. You'll also need 10GB of free disk space and a 600MHz CPU.

My philosophy on OS upgrades is that they are something that you do to rescue old hardware that you would otherwise never use. Say you are clearing out the loft and you find an old PC. It is running Windows Millennium, but with a cheap RAM upgrade could be persuaded to run XP. This might make the difference between having a machine that can be integrated with your existing network and maybe used to play MP3s or surf the web and a machine that is too annoying for anyone in the family to use.

But if this Win98 machine is your main PC then I would leave it alone. All the software you run on it is designed for Win98 and none of it will run better under XP. The only reason you would need the newer OS is if you wanted to install some new software. But that software won't run properly on your system under XP either, because your hardware is too old. Forget the philosopher's axe. Philosophers make terrible lumberjacks. If the handle is loose, go and buy yourself a new axe. **PCF**

Answers 1c 2b 3b 4d 5a

Luis and Ned

HOW LONG HAS IT BEEN SINCE YOU QUIT WORLD OF WARCRAFT?

NEARLY AN HOUR

Words Luis Villazon **Pictures** Mark Mitchell

state of the art #14

THE LATEST TECHNOLOGY EXPLAINED

PowerVR redux

PowerVR's tech enjoyed early patronage from Matrox, Hercules and Sega.

Could one of the early champions of 3D be making a comeback? James Morris thinks so

We're used to the 3D card market being a tit-for-tat match between NVIDIA and ATI. But in the early days, there were two companies slugging it out. Everyone remembers 3DFX, but you could be forgiven if its first major competitor had slipped your mind. When it was launched, the Voodoo card was up against PowerVR PCX-1 from the UK's own VideoLogic. Both were standalone PCI 3D accelerators, and the all-in-one card had yet to take centre stage.

Sadly, despite deals with Matrox and Hercules, plus inclusion of its technology in Sega's Dreamcast console, PowerVR failed to take off. The PC version of the second-generation Neon 250 almost sank without trace, and the Kyro cards produced under license by STMicroelectronics met only a lukewarm reception. When STMicro pulled out of the PC graphics business in 2002, it looked like the last few nails were finally being secured on PowerVR's coffin. But PowerVR is far from gone. In fact, you could find you have its technology in your pocket in the very near future.

A VISUAL HISTORY

PowerVR was different in that it used Tile-Based Deferred Rendering (TBDR). Instead of squirting polygons through a pipeline as they're received from the CPU, TBDR stores them in memory until an entire frame has been collected. It then splits the frame into rectangular tiles. These are processed one at a time, which has a couple of benefits. First, only the texture assets for the tile being worked upon need be loaded from video memory, which saves bandwidth. Secondly, the TBDR system works out which polygons will be visible, and then only sends visible pixels to be textured, saving on processing time.

With the traditional z-buffered approach, all polygons are rendered whether they're actually visible or not. Only once the pixels have been

POWERVR RENDERING

TEXTURE MEMORY	LOCAL MEMORY

T&L (Either by hardware or by the CPU) → **Clipping and Binning to titles**

Hidden Surface Removal
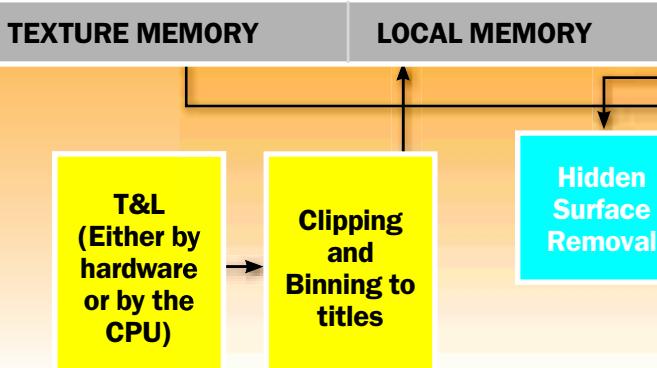
HOW TBDR SAVES TIME
With Tile-Based Deferred Rendering, Hidden Surface Removal is performed prior to texturing, so only pixels you will actually be able to see get rendered.

TRADITIONAL 3D

TEXTURE MEMORY	LOCAL MEMORY

Poly set to T&L unit one at a time, pipes render them one at a time as they come → **T&L Unit**
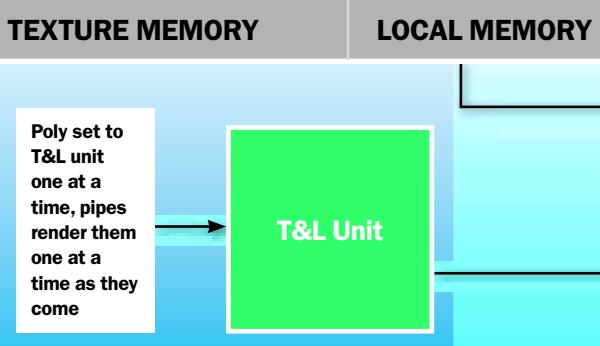
Z-BUFFER
With the traditional Z-Buffer approach to rendering graphics, 3D objects are textured before they're checked to see if they're actually visible in the frame, wasting bandwidth.

Sony Ericsson is also using MBX in a number of its other new phone releases.

With Intel's PXA2700G inside, which is based on PowerVR MBX, Dell's Axim X50v kick-started PowerVR's resurgence.

created and allotted a depth value do the invisible pixels get discarded. So regular graphics cards do much more rendering work than is actually seen onscreen.

More sophisticated z-buffering systems, such as ATI's HYPER-Z, render scenes at one or more lower resolutions first, to check if polygons will be hidden. This reduces the amount of wasted work, but doesn't entirely cut it out in the same way as TBDR. Intel's integrated graphics also do something called Zone Rendering, but this doesn't perform Hidden Surface Removal, it just cuts the frame into tiles to ease the amount of calls to memory.

So, with such unique and powerful technology, why did PowerVR's system fail to live up to its promise? Simply put, the time-saving benefits of TBDR weren't enough. PowerVR wasn't capable of creating the high-resolution eye-candy games require in the first place. ATI and NVIDIA have taken a sledgehammer to this particular nut, and smashed it to tiny little pieces. However, saving work does have its benefits outside the power gaming desktop arena. By allowing you to use lower-clocked, less power-hungry GPU cores, TBDR can potentially bring faster 3D to battery-powered devices. This is precisely where PowerVR has found new success – in mobile phones and other handhelds.

PHONEY GRAPHICS

When Intel started licensing PowerVR, some surmised that integrated Intel graphics cards would use it in future, particularly as Zone Rendering was already part of Intel's architecture. While that's not out of the question, Intel is primarily focusing on its XScale CPUs for handheld devices. It originally licensed PowerVR's fifth-generation MBX for its PXA2700G graphics co-processor. This has already made its way into Dell's Axim X50v and X51v PDAs, amongst others.

Texas Instruments, Samsung, Philips, Freescale, Renesas and Sunplus have all also licensed MBX, and in turn have incorporated it into their own chipsets. MBX is being used to provide 3D power for in-car information systems from Pioneer and Mitsubishi, but phones have been the major focus. PowerVR can be found in Motorola's MS550 camera phone, plus a number of models from Fujitsu and Mitsubishi in the Japanese market. Nokia's much-anticipated N93 will have MBX graphics, and Sega's integrated Sammy Aurora platform will incorporate MBX. Sony Ericsson has a plethora of phones with built-in MBX. The SO902i is destined for the Japanese market, but the recently released P990 and M600 will soon be hitting Europe. Perhaps the biggest coup is that Sony Ericsson's W950i Walkman phone uses MBX. This could be the most important phone released this year.

Far from disappearing without trace, PowerVR has simply changed tack. Its name could become synonymous with powerful graphics for phones in a way it never quite managed on PCs – and MBX is just the beginning. The next-gen PowerVR SGX, for example, is already being licensed by Intel.

PowerVR SGX will come in three designs, with up to eight pipelines. It allegedly 'exceeds OpenGL 2.0 shader and Microsoft Vertex and Pixel Shader Model 3 requirements', according to Imagination Technologies. Indeed, PowerVR SGX is very much state of the art. It incorporates a Unified Scalable Shader Engine, which merges pixel and vertex shading in a similar fashion to the Xbox 360's Unified Shaders (see *State of the Art #10, PCF185*). It can also use its pixel shading pipelines to perform MPEG-4 and H.264 encoding and decoding work.

So it could bring a whole lot more than just powerful 3D gaming to handhelds. PowerVR isn't ruling out a return to the PC
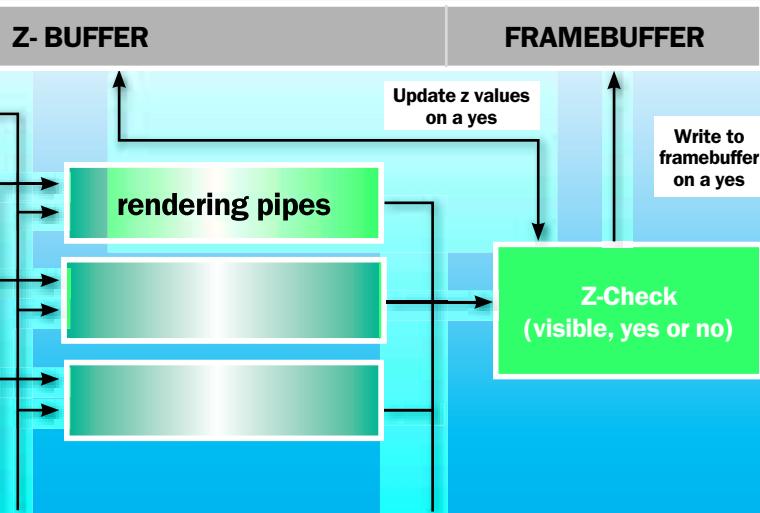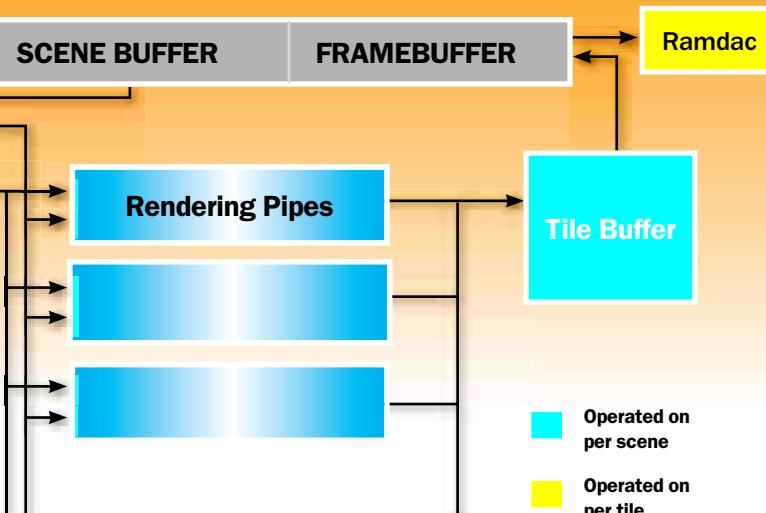
| SCENE BUFFER | FRAMEBUFFER | Ramdac |

Rendering Pipes

Tile Buffer

■ **Operated on per scene**

■ **Operated on per tile**

| Z- BUFFER | FRAMEBUFFER |

Update z values on a yes

Write to framebuffer on a yes

rendering pipes

Z-Check (visible, yes or no)

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Restart
THE GAMES WE'VE LOVED

Rise of the Triad

REDISCOVER Be warned: this one hasn't aged well

Dropping into our consciousness at around the same time as *Reservoir Dogs*, *Rise of the Triad* was a pre-*Duke Nukem 3D* two fingers up to the ban-this-sick-filth brigade. Originally designed as a sequel to *Wolfenstein 3D*, *ROTT* provided a myriad of ways to burn, maul and eviscerate your foes. *Rise* was stuffed with ideas – weapons ranged from heat seeking missiles to a god pickup that transformed you into a seven foot tall deity. Charged with the possibilities of a TCP/IP-friendly Windows port of the rusty shooter (*WinRott*, found at **tinyurl.com/mrvvv**),

we fired it up in the hope of some outrageously violent deathmatch antics. Sadly, in deathmatch, the game becomes a ridiculous spin cycle of rockets and giblets. The only amusing moment was watching Alec's pixellated pugilist, named Ian Paul Freeley (geddit?) reduced to a charred mass of shattered bones.

We'll be brutally honest, this isn't going to stand up to *Quake* in a battle of the deathmatchers, but if you have a fondness for this cult FPS then the amateur port of the publicly released source code is a solid way to enjoy it. Best stick to singleplayer though, eh?
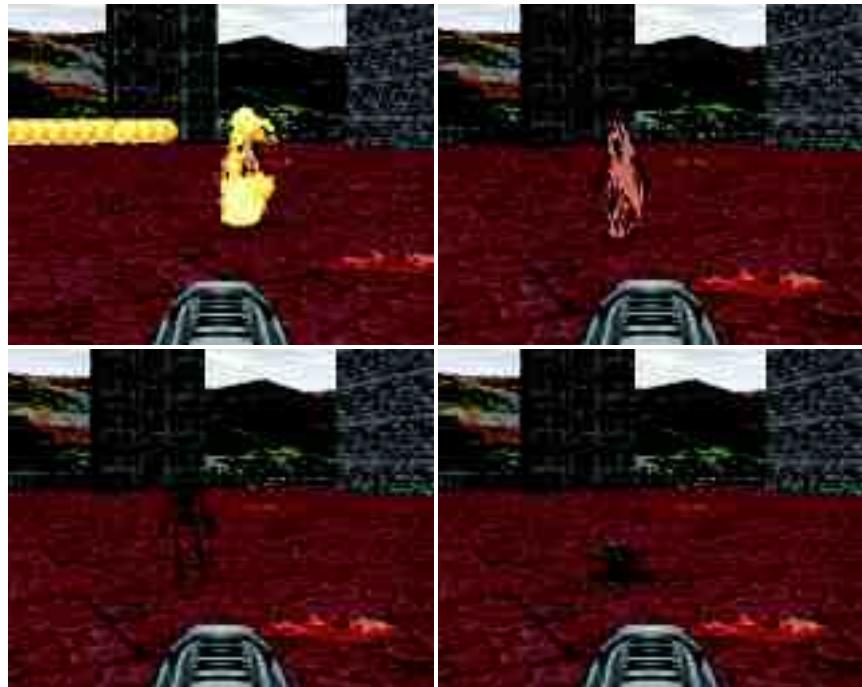
Watch and laugh as Alec's pixellated pugilist collapses in a xylophonic heap of tinkling bones.

```
FALSE PROPHETS
"THE AGREEMENT ALSO PROHIBITS ANY MODIFICATION OF THE
FORMAT AND SAYS THAT MEMBERS OF THE PUBLIC ARE
PROHIBITED FROM USING ANY SOFTWARE CONTAINING GIF
CAPABILITIES." THE SO-CALLED 'GIF TAX' REPORTED IN PCF41 IN
FEBRUARY 1995 NEVER MATERIALISED.
```

Bite me

We thought we'd do the gaming public a service by pointing out that the notoriously broken sequel, *Vampire the Masquerade: Bloodlines*, is being supported by a doting fan community. Now on version 2.3, the unofficial patch solves the action RPG's problems with pedantic zeal, including slight story inconsistencies. Anything that might persuade people to play this under appreciated gem should be celebrated.

PlanetVampire unofficial patch 2.3 thread
tinyurl.com/mw3wl

Media node

REINVENT Shuffle too common for your individualistic tastes? Try a retro twist…

You may remember that some time ago, *PCF180* in fact, we covered the conversion of a Nintendo Entertainment System pad into a fully functional PC gamepad. Well for some people this kind of vanilla adaptation simply isn't good enough. Repairs are old hat, we want to see full repurposing and that's exactly what this inspired piece of hacking allows. Rather than join the white plastic hoi polloi, one industrious net dweller decided to give his iPod Shuffle a retro makeover. Enter once again the humble NES pad (which has already seen more butchering than a back alley transplant clinic), in this case acting as the perfect sheath for the Shuffle's diminutive innards. Dave Sonnenshein, as the pad mangler likes to be known, has even rigged up the internals so that all of the Shuffle's functions are accessible from the controller's buttons. Elegant, clean and with a nod to the retro ticks all of our hack satisfaction boxes, so head on over to the Flickr set, which includes a link to instructions to build your own, at **tinyurl.com/ouaex**.

The spirit of Nathan Barley, it walks among us.

REMEMBER...

From pen and paper to point and click, the RPG that begat Vampire The Masquerade: Redemption was beautiful and interesting

Until **Nihilistic got its** hands on the franchise, White Wolf's pen and paper *World of Darkness* was the sole preserve of pasty basement-dwellers and marginally more athletic live-action roleplayers. But with such a rich universe based around vampires, werewolves and other mythical nasties, it seemed the perfect template for a point and click RPG. In swooped Activision with a fat wad of cash and the deal was done.

Redemption saw you in the leather bootees of one Christoph Romuald, a crusader in Medieval Europe. After an injury in battle, he rests in Prague to recuperate, but is nipped on the neck by a vampire called Ecaterina. Romuald is more than a bit miffed by his enforced turn to the dark side, and goes about bashing seven shades out of the less salubrious members of the vamp fraternity. Perhaps more interesting was the multiplayer mode, which allowed one player to take the role of story teller and possess characters, create items and grant experience live during the game. Demanding certainly, but immensely satisfying for those making the transition from the original notebook scribblefests.

ALSO OUT THEN...

MOTOCROSS MADNESS 2
Revving like a herd of stampeding strimmers, the bikes in *MM2* are pocket rockets. This was halcyon world of leaping hills in the dusty outback and performing life insurance invalidating stunts. Easily the most fun motorbike game ever.

SCORE
PCF 90%
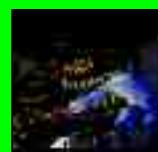
DINO CRISIS
Like *Resident Evil*, but wearing a pair of *Jurassic Park* boxer shorts, *Dino Crisis* suffered the same problems as its leprous brother – namely tardy controls and console port graphics. Still, there's nothing quite like performing shotgun facial surgery on a 30ft lizard is there?

SCORE
PCF 80%

EVEREST: RUINS OF KUNAPI
"There's nothing more embarrassing than reading something you wrote years ago" was Tech Ed Al's response this review of his. We can think of plenty of things, but they all involve waking up somewhere unfamiliar in slightly damp clothes.

SCORE
PCF 86%

LookingBack
THE CREATORS' CRITIQUE

The *Longest Journey* remains the only game which starts with a girl in her underwear… but it's not sexualised. It's just a girl getting out of bed.

The *Longest Journey*'s eerie landscapes were legend.

The Longest Journey

Kieron Gillen solves the puzzle of game development. It's not just point and click

The character models are impressively detailed.

This is a confirmed classic. While everyone else was wrapping up the history books of the point-and-click genre, Ragnar Tørnquist and his team at Funcom were making what would prove to be the bookend of an era. Yes, *The Longest Journey*, from the start, was the last great… er… platform game?

"The dark secret is that *The Longest Journey* began life as a platform game," reminisces Tørnquist, "Fortunately, that didn't last long." Of course, *The Longest Journey* – the tale of April

Ryan and the dual worlds of Starke and Arcadia, was a point-and-click adventure. But the fact it *The Longest Journey* was a *tale* is what lead it to the genre. "I wanted to tell a story, a specific story – and that's why we ended up making an adventure rather than an RPG or an action game," he explains, "We were all fans of the classic adventures from LucasArts and Sierra, and I'd made a bunch of text adventures on the Commodore 64 back in the day, so the genre was a natural match. It was all about the story, and finding the gameplay mechanics to suit that."

Finding and getting the mechanics in a satisfactory state didn't exactly happen quickly. Development started in 1996 and the game didn't arrive until 1999 – a particularly long development cycle in those days. "We were a smallish team working on a pretty enormous and ambitious game, and we had to build everything from scratch," explains Tørnquist. "The engine, the tools, the game editor – everything. And we seriously underestimated the time it would take us to finish. Our projected development time when we started was 18 months. It took almost twice that, and we went way over budget. It was a miracle the game wasn't cancelled, because by that time point-and-click adventures were basically dead, but Funcom stuck with us and supported us. Our problems were mostly of a

technical nature: getting the engine to do what we wanted it to do, producing all the assets. The design didn't change much during development, and neither did the story, which was also the reason why we were so delayed."

PLAY THE LONG GAME
Not compromising the story was central to the team's development. In comparison to the majority of games where a story exists only as motivation for who to kill next, trying to create a narrative with a degree of weight is a different challenge. "We wanted to create something different, something fresh and original, something meaningful. Also, I wanted to tell a story that wasn't simply about saving the world – although there's that, too," Tørnquist expounds, "I wanted April Ryan to be a real person, someone the player could empathise and identify with, someone with a background, a history, a love life, friends, family… and someone who would go through a transformation during her journey. It definitely wasn't revolutionary, but it certainly felt that way to a lot of players, because games hadn't really focused on those things before. I was a storyteller first and a designer second, that's why we had that particular focus." Upon completion, *The Longest Journey* suffered a staggered release across dozens of countries. "It

Casablanca? Doctor Doolittle IV: Chatting up Camels?

"Offers delightful ocean aspect. Rustic-style balcony and easy cliff access. An ideal fixer-upper."

was out in Scandinavia a whole year before it was released in North America," Tørnquist explains, "We had a hard time finding local partners in every territory, especially the US, because no one there believed in adventures any more". The delay did have its advantages. "The delayed release allowed us to make a number of changes for the North American version, like additional dialogue, new animations, bug fixes…" he explains, "I believe the unintentionally staggered release helped build a cult following in Europe, which was reflected in strong sales across the pond."

Here was a game that attracted people who were happy to buy into its world and be moved. How does Tørnquist believe the game had this effect? "I think it's pretty simple: it was different," he argues. "It was a game for a mature audience, with a focus on story and characters. It resonated with players who felt the game treated them as adults, and they appreciated that." Of course, the game wasn't perfect. There's much which makes Ragnar rueful. "The pacing was spotty, and there were a couple of really awful puzzles," he notes, "Some players were stuck for days, weeks and many just gave up. A number of the dialogues also went on and on. I hadn't really gotten to grips with the concept of 'editing' yet."

CUT TO THE CHASE
This strange and curious concept was one of the things the team tried to work into the second game. Other changes? "A more evenly paced story," he answers, "Fewer obscure puzzles; we

made *Dreamfall* easier based on feedback from players. A shorter game, because a lot of people never finished *The Longest Journey*, and we want everyone to make it to the end of *Dreamfall*. You wouldn't write a book or make a movie if you didn't think people would bother finishing it. With a game that's all about story, the point isn't necessarily to provide a tough challenge: it's about motivating and guiding the player through the story, and that's something that *Dreamfall* does a lot better than *The Longest Journey*."

As a veteran, what advice would he offer to someone with the thankless task of merging narrative and gaming together? "Adventure games are all about story and characters. Let the gameplay emerge naturally from the story," Tørnquist argues, "Be willing to make changes if the gameplay demands it later on, and don't stick with something that doesn't work simply because it's 'what's supposed to happen'. You'll make a better game – and tell a better story – if you allow changes to happen during development."

Ultimately, the best thing about creating *The Longest Journey*. "I got an email from one guy who told me that the ending made him cry," Tørnquist recalls, "He'd never even cried at a movie before, let alone a computer game. It was a really strong and honest emotional reaction, and that mail made me realise we'd accomplished something valuable. Just touching one person that strongly – it made the whole thing worth it." **PCF**

"The game treated players as adults and they really appreciated that"

Under the influence
Imagery and media that made an impact

While most game developers will just list a selection of defining games in the genre, for The Longest Journey Tørnquist was looking as much to other media. For example, sequential art, AKA comics. "Neil Gaiman's The

Sandman was a huge influence, plus other mid-to-late Nineties Vertigo titles like Swamp Thing and Preacher. I was very much into comics and the contemporary fantasy genre at the time – I still am, and my next game will

definitely reflect that. Another big influence was Buffy the Vampire Slayer; the TV show, not the movie. Some of April's dialogue betrays my love affair with the work of Joss Whedon." Powerful and fascinating influences indeed.

Developer Diary

Kaos Lead Designer Frank DeLisle wants more from first-person shooters…

Why is it that most single-player games in the FPS genre follow the same recipe? Sure, it's fun to follow the experience exactly how a game developer wanted you to. Sure, its fun to play a cinematic shooting gallery. But isn't it time for a little innovation?

I love FPS games, but more and more I find that I am not playing them right to the victorious end. The primary reason for this is the lack of player choice. Sometimes you feel that the game forces you to adopting a playing style that you kinda hate, playing to just get to the next level. That, combined with the 'die, redo, die, redo' philosophy and no other strategy but to learn how to shoot better leaves the FPS with few redeeming features. In my FPS fantasy, if I couldn't find a way to get through the alley, I would climb the fire escape to the top of the building and throw some air conditioners down from above, when they are least expecting it.

In fact why is it fun for the same enemies to always be around that same corner? Why do we always have to back up time and again and redo the same scenario until blue in the face? Can there at least be some randomness where the enemy has picked a new window to snipe you from? Or suddenly there's a spare air conditioner lying about?

It's like playing poker while always knowing the hands of the rest of the players. It's bland, it's empty and it kills the strategy. While there are open-world games out there, they are either open and not cinematic, or cinematic and on rails. I think there is a true middle ground where you can tell a story, keep it cinematic and intense without making it too difficult for the player to grasp and aim for it to be as non-linear as possible.

A couple of top first-person shooters came close when they introduced the ability to take on a number of objectives in any order, but that's only part of the solution. There really was no advantage in doing the objectives differently. It is now a goal of mine to find that balance of intensity, replay ability and strategy that that the genre desperately needs to keep it fresh and exciting going forward. I fear that without just such a development, the genre could stagnate further.

ReFresh
OLD GAMES, NEW LIFE

The Mod Squad
Keep that gaming fire alive

Oscuro's Oblivion Overhaul

Game Elder Scolls IV: Oblivion

Web elderscrolls.filefront.com

If you've had your fill of *Oblivion*, take a look at this mod. It combats the realism issues that plague this excellent RPG. Each NPC has been tailored to include a level cap to stop them growing to obscene levels. Elsewhere, rewards for the light-fingered among you have been increased and more random encounters with new creatures should also occur if you decide to travel out in the wild.

Pilotable Strider

Game Half-Life 2

Web www.stridermod.com

Chances are that if you've played *HL2* then you'll want to get your hands on the Striders. This enigmatically named mod does exactly what it says on the title screen. Not only that, but you also get to mess around with the Combine gunships and APCs. It's in its Alpha phase at the moment, so the code is a little flaky in places, but you still get to stomp around in the spindly-legged freaks with the enormous guns.

HONOURABLE MENTION

Causality Effect
Game Half-Life 2
Web causalityeffect.irswedish.com
Already picked up Half-Life 2: Episode One and played it to death? Fancy another Freeman-related challenge? Make way, then, for Causality Effect. It's a singleplayer mod with multiple endings, starting at the point in the original game where Lamar gets in a tangle with the teleporter. The susequent explosion rips a hole in the random scientific word continuum and you have to set it right. And be warned: it's not as easy as it sounds.

MMOG Log
Surveying the troops

The ongoing online survey, The Daedalus Project, has released some new findings. The survey has been going on since the Autumn of 1999 with more than 30,000 people taking part in the first couple of years. Some of the most interesting findings are about relationships within MMOs. Around 80% of female respondents, and 60% of males, admitted to flirting with characters online, but interestingly, in the 12-17 age range, the number of lads dropped to 36%. You could say they were less interested in the bump than the grind, then... Check out **www.nickyee.com/daedalus** for the latest findings.

Seemingly bonkers Asian MMOs often find unexpected success in the West, and *CABAL* could be one to capture our hearts. To see what all the fuss is about, register for the closed beta test at *www.cabalonline.com*. While we're on the subject of Asian MMOs, *RF Online* is set for its first patch, the two-part *Giga Final*. As well as adding battle dungeons and new skills, there's also the exciting prospect of guild versus guild combat.

RE-RELEASES THIS MONTH
Once more unto the breach, dear gamers

Fallout Collection
GSP ≫£10
Don't let the dated graphics put you off this classic title. The pack features the original and its sequel, as well as *Fallout Tactics*, the thinking man's combat game based on the series.

Blitzkrieg Strategy Collection
GSP ≫£10
A one-stop shop of WW2 strategic assaults is on offer here. Combining the original with its expansion, *Burning Horizon*, you get two bundles of joy for the price of one.

Joint Operations: Typhoon Rising
GSP ≫£10
This large multiplayer wargame paved the way for *BF2*. You now have the opportunity to get in and drive those vehicles of war over 50km² maps. So what are you waiting for? Roll out...

Rainbow SIx 3: Raven Shield
Sold Out ≫£5
Terrorist takedown is the order of the day here. You must fight your way through 15 levels of squad-based action, even halting an armed raid on a London bank.

Over to you...   HAVE YOUR SAY

Remember the first time?

We told you what the meaningful moments of our computing lives were this issue, so for this month's survey, we asked you which milestones had the biggest influence on your hobby

ONE IN THREE people owned an original 3dfx Voodoo or Voodoo 2 card, while a further fifth of you opted for arch-rival S3's Virge and SAVAGE chips back in those halcyon days. We all had to start somewhere **after all.** Mind you, another third of you waited as late as the Voodoo 3 before making the leap into the 3D card market. What took you so long, eh?

60% of PCF readers started off on pre-Pentium We are old timers, aren't we? **1/3** of you owned a machine based on Intel's 286 processor.

22% of readers started out on the road to PC nirvana with a machine that boasted a mere 8MB of RAM

Half of the votes cast concurred that the most significant breakthrough in computing was broadband. Why? "What can't be done with broadband?" was the most succinct answer

We asked you what your all-time favourite game was. Apart from the wag who claimed to prefer **Sudoku Dragon** to any of Valve's finest, it was a fairly commendable lineup. There's a pleasing number of flight sim fans out there still, but the far and away favourite was **Doom** ("Right game, right time, I still play it now") closely followed by **Half-Life**. **Deus Ex** and **Elite** got joint honours for **THIRD PLACE,** which will come as no surprise to anyone who's battled through either epic, while **Civ 2** and the **X-Wing** games were voted **EQUAL FIFTH**. To the gamer who nominated

Need For Speed 4 as the greatest game ever **made,** we can only suggest they might be happier reading our sister mag, *Redline*.

Nearly **30%** of you voted the 3D card as the most important tech

15% of you tipped legal video downloads as the next big thing. But **ONE IN THREE** readers is backing quad core as next year's technology to watch. **It's all about** "speed, speed, speed" apparently – although one reader did confess that "I have no idea about any of this stuff." We try, really we do...

WIN!

Sign up to our newsletter at www.pcformat. co.uk and you'll receive our Over to You survey every month. Bung us your answers for a chance to win a top-of-the-range Shuttle XPC SN25P barebones system. It supports Athlon 64, HyperTransport, and PCI Express.

Growing up with computers. Any more significant firsts we've omitted? Email pcfmail@pcformat.co.uk